PAINT and varnish PRODUCTION

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JANUARY 1950

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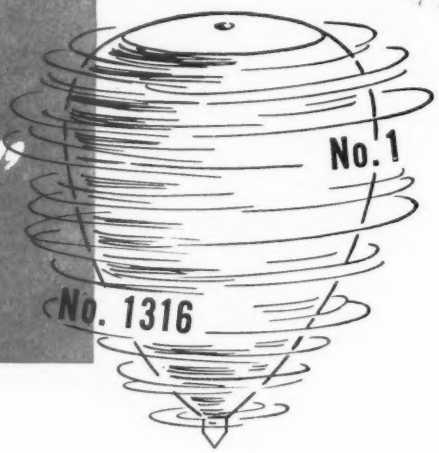

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PAINT and varnish PRODUCTION

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VOL. XXX NO. 1

FEATURES

DEPARTMENTS

NEXT ISSUE

There are many types of phenolic resins on the market to-day, which are used in the surface coating industry for the purpose of improving film properties of various vehicles. It is with this thought in mind that we are scheduling a comprehensive article on phenolic resins covering such factors as chemical aspects, classification, properties, application, etc. The author discusses such types as glycerine modified phenolics, rosin modified phenolics, and oil modified phenolics, and describes how these may be used in lacquers, varnishes, and enamels.

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Progress Through Research

IN GLANCING over the developments which have occurred in the paint industry during 1949, one cannot help but recognize the importance that research is playing in this industry every day. To the average person, it is difficult to believe that there is such a thing as research in paint. To many users "paint is paint," and little is known of the ingredients and methods used in its manufacture. However, the paint industry as other industries has always relied heavily on research in developing new and improved products.

During the war many paint technicians kept themselves busy and developed products which would seem fantastic ten years ago. These discoveries have resulted in the introduction of many and new improved products during the past year. New raw materials, new formulating and manufacturing techniques have made possible paints which are different in physical and chemical make-up and overwhelmingly superior in performance than anything yet produced.

In the field of household paints, one firm is now offering a washable interior paint which is odorless and nonflammable. This paint is formulated from a synthetic rubber base. Because of its chemical make-up, it knits itself smoothly over the surface leaving no brush marks. One-coat house paints with exceptional hiding and ease in brushing have been featured this year. These contain pigments of higher hiding power and resins which have better brushing characteristics. Floor and linoleum finishes with high resistance to scuffing and wear, and also self-waxing were marketed during the year.

In the industrial and maintenance field, corrosion resistance coatings based on a vinyl copolymer for petroleum and chemical tanks have appeared. Several materials with mold-, rot-, and mildew-resistant properties were publicized. Much progress was made in anti-fouling paints for marine use. Heat-resistant finishes derived from vinyl resins which will stand high temperatures have been announced. The technique of applying polyethylene by a flame-spraying method was finally perfected last fall. Many new types of fire-resistant and fire retardant paints have appeared during the past year.

Regarding manufacturing methods, considerable interest has been expressed in the use of supersonic energy for paint mixing. At the present time, studies are still under way to determine the practicability and value of this process in mixing operations. Polymerization studies utilizing high intensity electron irradiation and silent electric discharge were initiated last year. Announcement of the availability of maleic anhydride in the form of briquets and broken rods was well received in view of the toxicity and handling problems connected with this chemical.

During the past year, many new raw materials have been made available to the paint industry. Many of these have been used in formulating new types of paints; others are still under investigation.

These include modified styrenated alkyds and oils, soya alkyds, silicon-alkyd combinations, polyesters as plasticizers, and emulsified polytetrafluorethylene; various unsaturated monomers such as vinyl ethers, acetylinic alcohols, allylamine, and allyl starch in pilot plant quantities. Also, introduced during the year were various types of organosilicons, maleic esters, diallylcyanamid solvent, styrene copolymer emulsions, tertiary amines for emulsion paints, and light color octoic acid driers. Pigments of interest to the paint industry include colloidal silicon dioxide solution, non-hazing zinc oxide, and an improved form of titanium dioxide which features low reactivity with vehicles.

Many new and interesting problems will confront our paint chemists this year. Coatings which will repel radioactive rays effectively may be the highlight of 1950. New types of film-formers will be synthesized and these will offer interesting materials for investigation. Coatings which were considered a possibility in 1949 may be a reality in 1950.

TETRACHLORO PHTHALIC ANHYDRIDE

By D. J. MEHTA
H. F. PAYNE

THIS PAPER describes some experiments with tetrachlorophthalic anhydride as the dibasic acid in oil modified alkyd resins and in the dibutyl and di-2-ethyl hexyl esters. In the alkyd resins, comparison was made with the conventional phthalic anhydride using linseed, soya and coconut fatty acids as the oil modifier. It was found that a marked improvement in color of the tetrachlorophthalic-oxidizing oil alkyds could be obtained by incorporation of 1.5% maleic anhydride and 0.5% oxalic acid.

The linseed modified alkyds were evaluated in fire retardant paints and the soya and coconut modified alkyds in combination with urea-formaldehyde resins in white baking enamels. The alkyds made with tetrachlorophthalic anhydride were superior to standard phthalic alkyds in the fire retardant paint. The color of the tetrachlorophthalic-soya modified alkyds was inferior to standard phthalic alkyds and not satisfactory for white baking finishes.

The dibutyl and the di-2-ethyl hexyl esters of tetrachlorophthalic anhydride were evaluated as plasticizers in nitrocellulose lacquers and in vinyl chloride-acetate copolymer compositions. The esters have low volatility and good fire retardant properties but they are not so flexible as the comparable phthalate esters. The di-2-ethyl hexyl tetrachlorophthalic ester exudes badly from the copolymer compositions at concentrations required for the necessary flexibility.

Literature Survey

RECENT large scale commercial production of tetrachlorophthalic anhydride (TCPA) has made this material of increased interest for the manufacture of alkyd resins and plasticizers. An excellent literature survey on the uses and reactions of TCPA is given by Lawlor (4). Woodstock (9) described the growth of the plasticizer industry, about 200,000,000 pounds produced in 1948, and he cites the need for new and better plasticizers. For example, the extremely useful vinyl co-polymers depend on plasticizers in practically all of their applications. The vinyl resins are quite fire resistant but this resistance is lowered by many plasticizers.

Stevenson, et al. (8) describe a series of ester plasticizers, using TCPA and alcohols containing from three to eight carbons. Evaluation of these esters as plasticizers in baked films of Vinylite VYNV-2 showed that no one in the series was so flexible as di-octyl phthalate. In Vinylite VYDR compositions, they observed that there is a decreasing compatibility of the plasticizer as the chain length of the alkyl group is increased and that the n-octyl derivative exuded in considerable amount, particularly at high concentrations. They found a pronounced degree of flame resistance in vinyl compositions containing the TCPA plasticizers.

Lawrence and McIntyre (5) found that the introduction of chlorine into the benzene ring of the phthalate plasticizer produced a decrease in plasticizer efficiency and low temperature flexibility, but the chlorine gave less volatility and improved resistance to migration. The fact that TCPA contains almost 50% chlorine makes it of interest in flame resistant resins and plasticizers. Inasmuch as the chlorine is in the benzene ring of the molecule it is a highly stable product. However, the very dark color of some of its resinous products indicates a slight decomposition with the formation of highly colored bodies. Dreyfus (2) (3) in British and U. S. patents describes the esters of TCPA as plasticizers for cellulosic compositions; and Clark (1) teaches their value in polystyrene, methyl methacrylate and cellulosic compositions.

Little or no work has been published on the use of TCPA in the conventional oil modified type of alkyd resins. However, it is generally known that alkyds made with TCPA, instead of phthalic anhydride, are darker in color. In general, the intensity of color difference increases as the unsaturation in the oil increases. For example, linseed TCPA alkyds are very much darker than linseed-PA alkyds, but the difference in color decreases progressively with soya and coconut oil modification. Maleic anhydride has been used to obtain improved color with PA alkyds and similar results are obtained in the present work with maleic anhydride in TCPA alkyds. However, the best overall result was obtained with a mixture of maleic anhydride and oxalic acid, even though oxalic acid alone did not improve the color significantly.

Experimental Procedure

THE experimental procedure may be divided conveniently into two parts; the first covering the work with alkyd resins, and the second part covering the work with the ester plasticizers. The alkyd resins were made by the conventional fatty acid process, in which the dibasic acid, glycerol and fatty acid are placed in the kettle and processed at temperatures from 430°F to 450°F, until the desired acid number and viscosity has been reached. The resin is then cooled to about 400°F and thinned with the solvent to a total solid content of 50% or 60%.

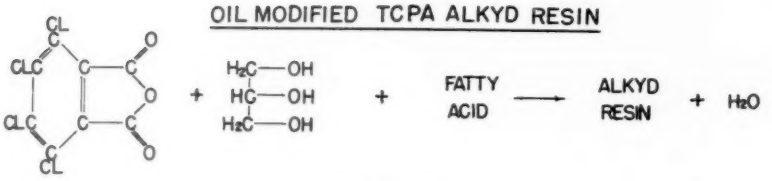
Alkyd resins were made with phthalic anhydride and TCPA as the dibasic acids, glycerol as the polyhydric alcohol, and with linseed, soya and cocoanut fatty acids as the

Alkyds and Plasticizers

oil modifier. The alkyds were formulated to contain 40% oil and 60% resin which corresponds to a medium oil length alkyd resin. The calculations for these formulations are given below.

The difference in combining weights of phthalic anhydride and tetrachlorophthalic anhydride necessitates a difference in percentage composition of the ingredients required to produce alkyds of equal oil length. Since both materials are dibasic, their relative combining weights may be taken as equal to their molecular weights. Typical theoretical calculations for alkyd resins of 40% oil and 60% resin are shown below. With practical resin formulation an excess of glycerol is used to obtain the best results, and a 15% excess glycerol was used in the present work.

The experimental alkyds were cooked in a standard three neck flask with inlets for inert gas, thermometer and mechanical stirrer. The flask was heated by means of an electric mantle. Samples were withdrawn at various intervals for acid number and viscosity determinations. After processing, the resins were thinned to the required solids content and filtered.



Chemical Reaction

CALCULATIONS FOR RESIN FORMULA
REQUIRED: 40% OIL, 60% RESIN

3 MOLS LINSEED FATTY ACID	= 3 X 286 =	858
1 MOL GLYCEROL	= 1 X 92 =	92
		950
LESS 3 MOLS WATER	= 3 X 18 =	54
		896 OIL

FOR PHTHALIC ALKYD RESIN:

3 MOLS P A = 3 X 148 =	444
2 MOLS GLYCEROL = 2 X 92 =	184
	628
LESS 3 MOLS WATER = 3 X 18 =	54
= GLYCEROL PHTHALATE	574 (G.P.)

IF 896 OIL = 40%
THEN 1344 G.P. = 60%

$\frac{1344}{574} = 2.342$

2.342 X 444 =	1040
2.342 X 184 =	431
	1471
LESS 2.342 X 54 =	127
	1344

FINAL FORMULA FOR PA RESIN

		BY WEIGHT	%
PA		1040	42.9
GLYCEROL		523	21.7
LIN. FATTY ACID		858	35.4
		2421	100.0
LESS WATER		181	
		2240	
OIL	=	896	40.0
GP	=	1344	60.0
		2240	100.0

FINAL FORMULA FOR TCPA RESIN

		BY WEIGHT	%
TCPA		1168	49.4
GLYCEROL		342	14.4
LIN. FATTY ACID		858	36.2
		2368	100.0
LESS WATER		128	
		2240	
OIL	=	896	40.0
G-TCP	=	1344	60.0
			100.0

Table I

Improvement of Color

ATTEMPTS were made to improve the color of the resins by adding up to 2% of various materials. These included maleic anhydride, fumaric acid, oxalic acid, ammonium oxalate, zinc oxide, lead monoxide, and magnesium oxide. The addition of 2% maleic anhydride produced a marked improvement in color, particularly with the linseed modified alkyds, but it introduced a tendency to reactivity. Somewhat better color was obtained with a combination of 1.5% maleic anhydride and 0.5% oxalic acid and this combination appeared to be free from any objectionable reactivity.

The resin A, made without modifier, was extremely dark; much darker than the maximum color rating of 18 on the Gardner 1933 color standards. No significant improvement in color was obtained with 2% oxalic acid but the combination in resins D and E gave the best results.

Resin D, containing TCPA, and Resin E, containing PA were compared for air drying time and film properties of hardness, flexibility, water and alkali resistance. Resin D was slightly poorer than Resin E in all of these properties except alkali resistance. A test in 2.0% NaOH solution showed Resin D to have slightly more resistance than Resin E.

Since the principal interest in these resins was their use in fire retardant paints, the formulation given below was prepared. This formulation is not pigmented so heavily as the National Military Establishment Specification JAN–P–702, November 23, 1948, Paint, Inside, White Semi-Gloss, Fire-Retardant, and it is therefore a more sensitive test for the fire resistance of the resins.

The fire retardant test was made in accordance with the method developed by the Technical Committee of the New York Paint and Varnish Production Club (6). The paint to be tested is applied to the front, back and edges of popular panels and air dried for two weeks before testing in the Fire Test Cabinet.

The coated panels are placed in the cabinet at the specified angle and the flame from three ml. of absolute alcohol burning in a special cup impinges on the panel in a standard manner. The various stages of panel burning are checked with a stopwatch and the panel is removed from the cabinet when all burning has stopped. The flame intensity reaches a maximum and then decreases before the alcohol is consumed entirely. It will be noted that the panels coated with the TCPA alkyd paints stopped burning before the flame went out, owing to the decreased intensity of flame, but those coated with the PA alkyd paints continued to burn after flame had gone out, indicating a lower degree of fire resistance. Stages of fire test are tabulated in Table IV.

EFFECT OF MODIFYING AGENTS

LINSEED–TCPA ALKYDS

RESIN	A	B	C	D	*E
MALEIC %	—	2	—	1.5	1.5
OXALIC %	—	—	2	0.5	0.5
% SOLIDS	50	50	50	50	50
SOLVENT	M.S.	M.S	M.S.	M.S.	M.S.
VISCOSITY, G.H. TUBE	T	Z	T–U	X–Y	Z
COLOR, GARDNER, 1933	V.DARK	13	DARK	12	9
ACID NO. SOLIDS	22	21	18	11.6	10.8

*RESIN MADE WITH PA INSTEAD OF TCPA

Table II

FIRE RETARDANT TEST

WHITE, SEMI-GLOSS, FIRE RETARDANT PAINT

	POUNDS	% BY WT.
TITANIUM DIOXIDE	200	12.10
Mg SILICATE	100	6.05
WHITING	100	6.05
ANTIMONY OXIDE	100	6.05
RESIN SOL'N (50% SOLIDS)	900	54.45
SOLVENT	233	14.10
Co NAPTHENATE (6% Co)	20	1.20
	1653	100.00

FIRE RETARDANT TEST DATA

TIME IN SECONDS FOR:	PAINT MADE WITH TCPA	PA
FIRST DISCOLORATION ON PANEL FACE	35	27
FIRST BLISTER ON PANEL FACE	55	NONE
FIRST SIGN OF SMOKE	70	60
FIRST BURNING OF PANEL FACE	75	65
FIRST BLISTERING OF PANEL BACK	195	210
FIRST DISCOLORATION OF PANEL BACK	300	220
FIRST BURNING OF PANEL BACK	NONE	SLIGHT
ALCOHOL FLAME OUT	300	295
PANEL STOPS BURNING	295	305

Tables III and IV

Fire Retardant Data

THE above results show some superiority for the TCPA alkyd paint over the regular PA alkyd paint. However, the superiority is not large, due, no doubt, to insufficient chlorine in the dried coating. The resin contains 52.2% TCPA which is composed of 50% chlorine, therefore, the resin binder contains only 26.1% chlorine. It is known that a higher

(*Turn to Page 13*)

LITERATURE SURVEY

on Emulsion Paints

This literature survey supplements the article on Emulsion Paints, by Technical Committee #44 of the New York Production Club, which appeared in the December issue, and are abstracts of those references which appear on page 15 of that issue.

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Since it is practically impossible to cover completely the literature pertaining to any subject an attempt is made to include in this survey material from the various phoses of the subject of emulsion paints. These include the theoretical aspects of emulsification, the types of film formers, stabilizers, emulsifying agents and pigments. The survey is intended to point out where information on these subjects may be obtained and the general nature of the information.

The survey shows that a 40 to 50 gallon ester gum-linseed oil varnish is a favorite film former. However, examples are given of special drying oils, such as Trimol 80 and the Falkoloids, and the alkyd resins, coumarone-indene resins and polystyrene. Since any oil or resin may be emulsified, it is obvious that availability and cost are prime factors in many cases. When specific performance in the finished paint is required, this will be the deciding factor in the choice of film former.

Casein or other protein derivatives are widely used as stabilizers. These materials improve application and working properties of the paint and they do not detract seriously from scrub resistance when used up to 25% of the total film former. They require preservatives and are adversely affected by calcium and magnesium containing materials. This has led to the use of protein free emulsions several examples of which are given.

In general the ammonium soaps are satisfactory emulsifiers, particularly when they are formed during emulsification. This is done by putting oleic acid in the oil phase, and ammonia in the water phase so that the soap forms when the phases are mixed. References are given to a number of the other types of emulsifying agents.

The stabilizers other than casein include methyl cellulose, alginates, and starch dispersions, and insoluble materials such as Bentonite and special clays. Special wetting or dispersing agents are used occasionally, but these would be more important in colored than in white emulsion paints. The Dowicides A and G are mentioned most frequently as preservatives in the literature examined, but others are available such as Santobrite and Santophen (Monsanto), Cresophan (R. W. Greef Company), Collatone (Lehn & Fink) and Moldex, (Glyco Products). Lead and cobalt drier combinations are suggested and usually these may be added in any one of the regular forms; linoleates, naphthenates, etc.

The principal interest is in white emulsion paints which are based on the titanium and zinc sulphide white pigments with various extenders. Titanium calcium pigment, and extenders such as whiting, may be used with protein free emulsions and those which have a good tolerance for calcium and magnesium salts. Examples of both types are given. The highly colored emulsion paints are not included since special precautions must be taken with each color.

1. Advance Solvents & Chemical Corporation Technical Data, Advawet #33

Advawet 33 is a water soluble, oily liquid intended for use as a combination emulsifier and stabilizer. It is a non-ionic surface active agent and, since it is not ionized, it is not affected by calcium or barium pigments. It is a synthetic product, quite stable to acids and alkalies, and it produces very little foaming.

A suggested formulation for a flat white emulsion paint uses titanium calcium pigment in combination with a small percentage of diatomaceous silica. A 40 gallon ester gum-linseed oil varnish is the film former in the emulsion. The other materials are Advawet 33, sulphonated castor oil, sodium hydroxide and starch solution with lead and cobalt soligen driers.

2. American Cyanamid Company, Technical Booklet "Aerosol Wetting Agents"

This booklet decribe a variety of wetting agents of the modified sodium sulfo-succinate and naphthalene sodium sulfonate types. One of the most widely used is Aerosol OT which is dioctyl sodium sulfo-succinate. They are esters and therefore, susceptible to hydrolysis but they have good stability in normal use. They have superior tolerance for calcium and magnesium than ordinary soaps.

3. American Cyanamid Company, Anti-foam H.

This material is available in a stiff paste form which may be dispersed in warm water. The Anti-Foam H or or the water dispersion may be incorporated with oil-in-water emulsions during manufacture. It is widely recommended as an anti-foaming agent.

(Turn to Page 17)

This paper was presented by the New York Paint and Varnish Production Club, Technical Committee #44, Henry F. Payne, chairman, at the N. Y. Paint and Varnish Club on Nov. 10, 1949 for publication in the Official Digest of the Federation of Paint and Varnish Production Clubs and is published with their permission.

STORAGE AND HANDLING

By C. L. JONES, Hercules Powder Co.

AT MANY plants solvent and diluent storage tanks are placed underground. The legal requirements or the regulations of the insurance company may compel the use of underground storage tanks. In certain locations there may be some justification for burying tanks; for example, in highly congested areas. However, when room permits and ordinances and regulations allow, above-ground storage is much to be preferred.

An above-ground vessel can be inspected daily, or as often as desired, and the condition of the shell, connections and fittings be kept under observation. In the case of leaks, remedial action can be promptly taken; whereas, in the case of an underground vessel, the corrosion of shell and its failure, the failure of connections and fittings, etc., can occur and a leak exist for a long time, possibly creating a hazardous condition before anything can be done about the matter. Furthermore, infiltration of ground water can occur, causing contamination of the product.

This paper was presented before N. Y. Paint and Varnish Production Club on Sept. 8, 1949 for publication in the Official Digest of the Federation of Paint and Varnish Production Clubs and is published with their permission.

Above Ground Storage

IT may be argued that an above ground tank is more hazardous than a buried vessel, but this is not the case if the vessel is properly designed and fitted with the necessary safety devices, such as adequate relief, a vent protected by means of an approved flash arrester and the rodding connection of the vessel fitted with an approved rodding well. Such a vessel may be completely enveloped in flame for a long time without an explosion occurring. There may even be an explosive vapor-air mixture within the vessel while it is enveloped in flame, but nothing will happen except the burning of the vapor-air mixture at the discharge of the safety device.

In the case of such fires, the vessel acts as a boiler. Instead of water being evaporated, solvent vapor is driven off.

However, it is absolutely necessary that all of the tank connections be tight and the vent be of adequate size and that they be protected with an *Underwriters' Laboratories* or *Factory Mutual Laboratories'* approved flash arrester. If the vent is so protected, an ignition of the vapor-air mixture can occur at the vent, but it is not likely that a serious accident will result.

The accident next described will illustrate this point. There was a battery of eight large (about 10,000 gallon) horizontal solvent storage tanks sitting on piers. The vents of the tanks were just open pipes, and the end of each vent pipe came close to the ground. The plant was located on a wood lot, and there was considerable undergrowth and dry grass. A fire from some source communicated to this growth, and then to the open pipe vent of a tank containing a relatively small amount of solvent. The space above the liquid must have been in the explosive range, and when it was ignited, the

View showing flash arresters and vent valves on solvent storage tanks.

Interior view of solvent pump house. Ventilating fan supplies fresh air.

OF SOLVENTS

tank exploded and sprayed solvent over the entire area of the plant, which was aflame almost instantly. The tank was blown about 400 ft. across the tracks of a very heavily traveled railroad. Another tank exploded and was blown about 300 ft. The plant was a complete loss, although for some miraculous reason, no one was injured, and no lives were lost.

This particular plant was rebuilt, and the vents of the storage tanks were fitted with approved flash arresters. Another serious fire occurred, but no tank exploded. All that happened to the storage tanks was the loss by evaporation of a few hundred gallons of solvents from the entire battery.

Filling & Unloading

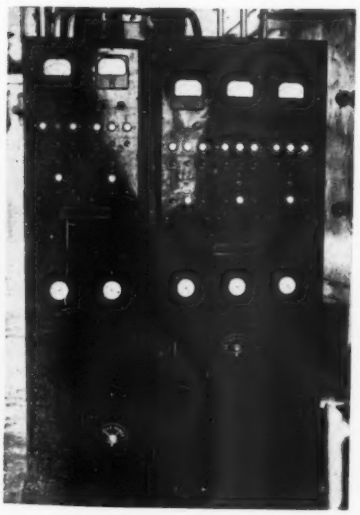
ANOTHER very important feature is the method of introducing solvent into a vessel. It is not uncommon to find inlets ending a few inches inside the tank or vessel top. Such a design permits the incoming liquid to break up into particles which fall through space. In so doing, a static charge can be formed. If the capacity on a charged particle is high enough, this can be the source of ignition of a vapor-air mixture within the vessel. There are a number of instances where the ignition of vapor-air mixtures has occurred, and it was conclusive that static from "static spray" was the source of ignition. The reason why there are not more of these accidents is probably because the vapor is usually saturated, and therefore, above the explosive range. Occasionally, a flammable vapor-air mixture exists, a spark occurs, and the flammable mixture is ignited resulting in an explosion.

To minimize this static spark hazard, the inlet or fill pipe should be brought close to the inside bottom of the vessel. It may not be practical in a number of cases to carry the fill pipe close to the inside bottom of a vessel. This is particularly true of mixers or dissolvers fitted with agitating equipment. In such cases, the inlet connection can be brought through the cover at a suitable location, and then bent so as to direct the flow of fluid along the inside wall of the vessel. With such a design, the stream is kept relatively solid, thereby avoiding the formation of a static spray.

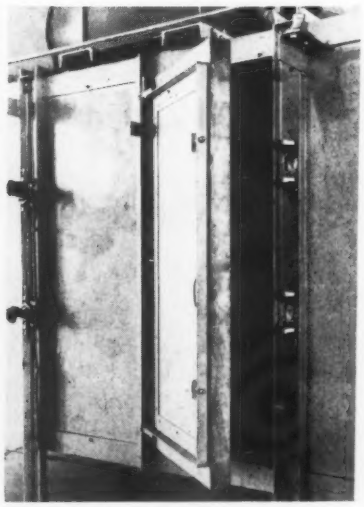
Another important matter is the unloading of solvents and diluents from tank cars. All such tanks should be top unloaded. This is practical and simple and reasonably safe if a pump with a good suction lift is used. Bottom unloading of such tank cars should be avoided because of the hazard connected with such a method. Many serious accidents have occurred resulting in the loss of life and a large property loss, which were attributed to or connected with bottom unloading of such fluids.

The Manufacturing Chemists' Association's Manual, Sheet TC-4, Unloading Inflammable Liquids from Tank Cars, describes and illustrates the procedure which should be followed in the unloading of tank cars containing solvents and diluents. Copies of this pamphlet may be obtained from the Manufacturing Chemists' Association, Washington, D. C.

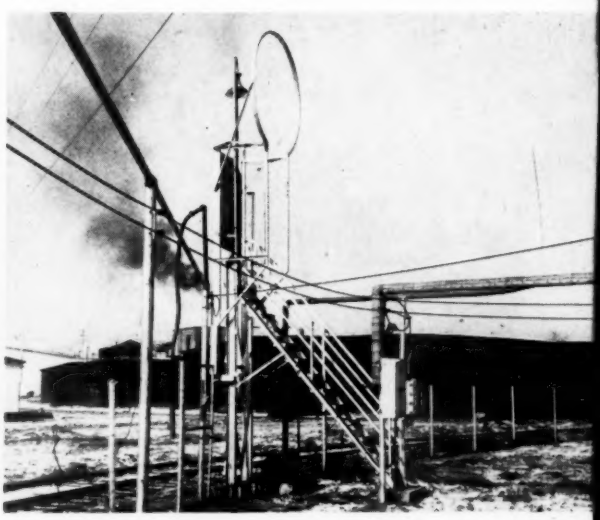
Gas analyzing equipment provides continuous analysis of vapor solvent concentration.



View of explosion venting door. Note the type of catches which are used to hold them closed.



Tank car unloading station. Solvents and diluents are removed from the top of tank car.



Another potential source of trouble and wastage of material is the stuffing box of pumps. It is not uncommon to observe a considerable leakage of solvent at the stuffing box of a solvent pump. This creates a dangerous condition on account of the formation of flammable vapor-air mixtures. This trouble can be largely overcome by the selection of a suitable device to replace the usual gland packing. There are several such devices on the market; one being the Dura Seal, made by the *Durametallic Corporation* of Kalamazoo, Michigan. A large number of these devices is installed on pumps handling various solvents and diluents, and the record of performance is very good. It is not unusual to have a report as to the performance reading something like this: "No maintenance and no leakage for a year."

Handling Solvent Drums

MOST lacquer manufacturers have the problem of handling some solvents and diluents in drums. Also, in many plants, it is necessary to draw small quantities of solvents and diluents for use in some of the mixing and finishing operations.

For the bulk storage of such drums, it is recommended that a detached and reasonably well isolated drum rack be used. It is undesirable to store drums in the manufacturing building, and the chief objection to the storage of drums inside a building is leakage, which is not uncommon, causing the formation of a vapor-air mixture, usually in the flammable range. If such drums are stored on an open sided drum rack, there will be good diffusion of the vapor if there should be leakage. This eliminates the formation of a large volume of an explosive vapor-air mixture.

A dispensing rack for the drums will be necessary at some suitable location in the manufacturing building, and several precautions need to be observed in the design and use of such a rack. The rack can be made of wood or of metal, but the surface on which the drums rest ought to be made of non-sparking material, say brass or copper, and such surfaces should be grounded. The equipment used for handling the drums on to the rack, for example, the tong and the hand chain of the hoist, should also be made of a non-sparking metal.

The chief hazard probably occurs at the time of drawing solvents from the drum into cans or other containers. This is due to the formation of a static charge as the fluid is dropped into the container. To prevent the formation of this static charge, the stream should be kept relatively solid as discussed previously for tanks and mixers. This can be accomplished satisfactorily by the use of a flexible non-sparking metallic hose. The container into which the fluid is drawn should be grounded, and also should rest on a grounded non-sparking surface, such as brass, aluminum, or copper.

The containers used for handling solvents should be made of a non-sparking material. It is not necessary to go to the expense of aluminum, brass, copper, or stainless containers. Steel is satisfactory, if galvanized. An occasional check should be made to make sure the galvanizing is in good condition; and when any of these buckets or containers show signs of the galvanizing wearing through, they should be regalvanized.

Leakage

ANOTHER source of trouble and loss is the leakage which occurs at valves, plug cocks and other closures. Such trouble is due to several causes such as the selection of a valve made of unsuitable metal, or unsuitable metal in the valve seat and stem, and unsuitable packing.

Conditions, of course, will vary from plant to plant; however, the hazard during the charging operation is such as to make it necessary that good exit conditions be provided so the operator can move away quickly and safely. In some instances, men have been observed working on an area of only a few square feet and with no means of quickly getting away. In other words, they were working from the surface of a portable platform or something similar; if a flash fire should occur while a man is adding material to a dissolver, there isn't much he can do except jump or fall. The distance may be as much as 10 or 12 feet from the floor, and if he jumps, he is apt to be seriously injured. In addition, he probably will be burned.

If there is a good working space around the charging level of dissolvers and good exit conditions from that charging level, then the exposed person can move rapidly and with safety, and the possibility of injury of any kind will be very much reduced.

Many lacquer manufacturers use hard resins, gums, etc., and in a number of cases these ingredients are ground primarily to reduce the dissolving time. There is a considerable hazard in grinding such materials. The hazard is that of a dust-air explosion, and some of these explosions can be quite violent and with a great deal of flame.

If such materials are ground, the grinding operation ought not to be carried out in the lacquer manufacturing building. It should be carried out in a separate structure, removed from other buildings or exposures, and provisions should be made for keeping the dust concentration in the grinding room or building below the flammable limit.

Also, it can be pointed out that grinding may be avoided entirely by the selection of the proper type of dissolving equipment. Equipment is available which will dissolve such hard materials in a reasonably short time. That is, broken material, say fist size and smaller, can be dissolved probably in an hour or less in certain types of equipment. The use of such dissolving equipment should eliminate the need of grinding, and thereby avoid an expenditure for such equipment.

Safeguards

TO protect persons against the hazard of flash fires of any kind, several safeguards should be adopted and enforced. First, their clothing should be changed often, and before there is a heavy accumulation of flammable materials on them. There have been a number of cases of persons wearing dirty clothing having their garments catch on fire and burn very rapidly.

Second, all persons exposed should be fully clothed at all times, summer as well as winter. This means wearing a head covering, sleeves down and collar buttoned. Third, it will be desirable to supply all employes with flame-proofed clothing. A great many

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. . . TETRACHLORO

(*From Page 8*)

pigment ratio improves fire retardance, but this would apply equally to the PA alkyd resin paint. It is not feasible to increase the glyceryl-TCPA portion of the resin (to increase chlorine content) because it was felt that the experimental resins already contained the minimum oil content for satisfactory application properties. It is known that resinous materials with a chlorine content in excess of 50% are good fire retardant binders; for example, chlorinated rubber and the highly chlorinated paraffins. Obviously if the oil could be replaced with a highly chlorinated material having comparable air drying and film forming properties, the fire retardant quality of the alkyd would be enhanced considerably. Unfortunately there is no known chlorinated material having such properties available today.

Modified Alkyds

SOYA and cocoanut oil modified alkyds were made by the standard fatty acid process using 450°F as the top reaction temperature. Soya modified resins were made with both 40% and 33% oil and the cocoanut alkyds with 33% oil only. The 40% oil modified resins were thinned with mineral spirits and the 33% oil modified resins were thinned with xylene. A marked improvement in color was obtained by using 1.5% maleic anhydride and 0.5% oxalic acid in these resins. Without this modification, the resins had a color of 12–13 on the Gardner Color Stds. and with the modification it was reduced to 8–9. However, this is not as pale as standard commercial resins made with phthalic anhydride instead of TCPA.

The experimental soya resin was compared with a conventional commercial product (Rezyl Resin 387–5, American Cyanamid Co.), in combination with 20% and 30% urea formaldehyde resin in white baking finishes. The experimental cocoanut resin was compared with Rezyl Resin 99–5 and Rezyl Resin 92–5 in the same amino resin combinations for white baking finishes.

In general, the TCPA resins baked slightly harder than the commercial standards and they were also slightly superior in alkali resistance but they were inferior in color and color retention on heating. Since original color and color retention is a very important requirement of this type resin, it was felt that further improvement in color properties of the TCPA resins would be necessary before they are satisfactory for this purpose. No fire retardant tests were made with these resins, but if the 33% oil resins were used in nitrocellulose lacquers with a fire resistant plasticizer such as tricresyl phosphate, the resin may be expected to contribute some fire resistance.

Esterification of TCPA

DIESTERS of TCPA and butanol and TCPA and 2-ethyl hexanol were made by refluxing the materials in standard esterfication equipment. Various catalysts were investigated but best results were obtained with sulphuric acid for the dibutyl esters and p-toluenesulphonic acid (PTS) for the di-2-ethyl hexyl esters. The materials were held at reflux until the required degree of esterfication was obtained as indicated by acid number. The rates of esterfication are shown in figure 1 using a ratio of 1 mol TCPA to 4 mols of alcohol. It will be noted that the di-butyl ester requires considerably longer time for reaction than the di-2-ethyl hexyl ester. The 4: 1 mol ratio is necessary for butanol to obtain equilibrium in a reasonable time but this ratio could be reduced somewhat for 2-ethyl hexanol.

After refluxing for the required percent reacted, the esters were decolorized with activated charcoal and the excess alcohol removed by vacuum distillation. The product was then neutralized with 10% solution of sodium carbonate, washed with water and steam distilled. The last traces of water were removed by refluxing with a Stark and Dean trap using xylene. Various characteristics of the esters were determined and others calculated with the results shown in Table V. (See Fig. 1).

The molecular weights of the TCPA esters were calculated from the saponification equivalents and from molecular refraction values and they agree quite closely with the theoretical values. The boiling points were obtained at reduced pressure and calculated for atmospheric pressure.

Ester	dibutyl TCPA	dibutyl PA	di-2-ethyl hexyl TCPA	di-2-ethyl hexyl PA
Theoretical Mol. Weight	416	278	528	390.5
Calc. Mol. Wt. from Saponification	419	–	510	–
Calc. from Mol. Refraction	412	–	515	–
Theory Saponification Value	270	–	213	–
Actual Saponification Value	268	–	220.5	–
Theory Saponification Equivalent	208	–	264	–
Actual Saponification Equivalent	209.5	–	255	–
Refractive Index, 20°C.	1.5297	1.4926	1.5175	1.4859
Specific Gravity, 20°C.	1.3350	1.0484	1.2100	0.9861
Boiling Point °C., 760 m.m.	350	339	657	386
Boiling Point °C., 10 m.m.	231	198	296	245
% Cl. Theoretical	34.1	–	26.9	–

Table V

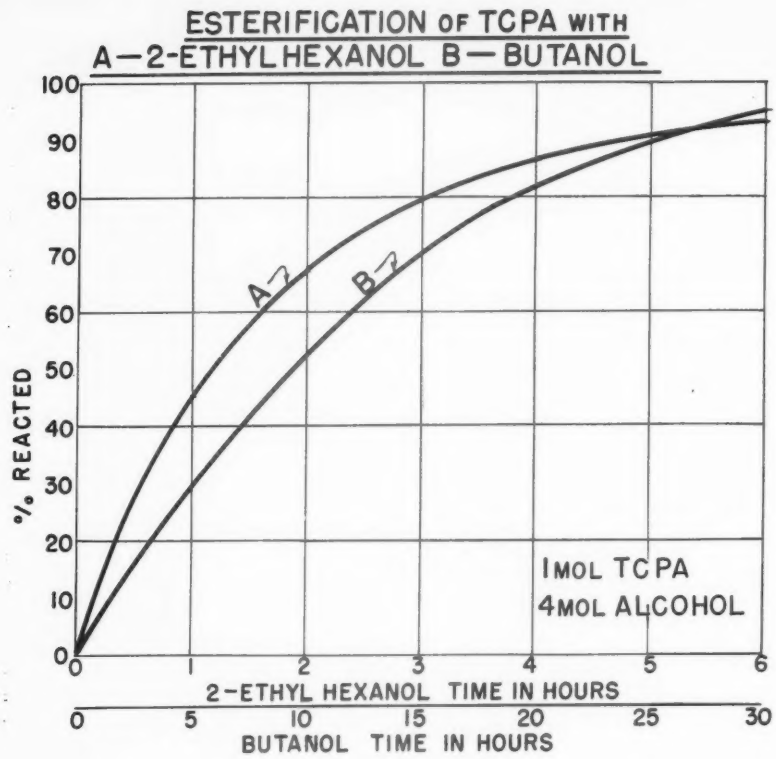

Figure 1

Use with Nitrocellulose

THE dibutyl tetrachlorophthalate and dibutyl phthalate were compared for their effect on tensile strength and percent elongation of free films of nitrocellulose. Mixtures were made containing 10, 20, 30 and 40 parts of plasticizer to 100 parts of dry nitrocellulose. These were dissolved in a typical lacquer solvent and the solutions applied to glass panels with a doctor blade. After drying overnight, the films were removed from the panels and allowed to age two weeks before testing with the results shown in Table VI.

Since the above results indicate that dibutyl tetrachlorophthalate is no improvement over dibutyl phthalate in the properties tested, and also its improved fire retardant properties would be expected to be negligible with nitrocellulose, no further tests were made with these materials. However, it may be expected that the dibutyl tetrachlorophthalate would be more permanent or less volatile than the dibutyl phthalate.

Evaluation with Vinylite

EXPERIMENTAL di-2-ethylhexyl tetchlorophthalate was compared with a commercial di-2-ethylhexyl phthalate ("Flexol" Plasticizer, D O P, Carbide Carbon Chemicals Corp) in combinations with Vinylite V Y N W (Bakelite Corp.). Three ratios of the experimental plasticizer were compared with a ratio of D O P which Reed (7) uses as an average standard. The combinations tested are listed below:

The compositions were milled on a laboratory 2 roll mill for 10 minutes each at a temperature of 280°F. There was no significant difference in workability on the mill or in the odor of the compositions. They were sheeted off the mill at 0.025 inch thickness. Sheets for stress-strain tests were pressed in a standard flash mold $0.02'' \times 6'' \times 6''$ for 8 minutes at a maximum temperature of 167°C. The conventional test samples were cut and tested with the results shown in Table VIII.

The above data indicate that the TCPA ester is not so efficient a plasticizer for Vinylite as the PA ester at equal plasticizer concentration. It might be expected that this could be overcome by using a higher concentration of the TCPA ester. However, this would not be possible because, after aging for one week, a considerable exudation of the TCPA ester was observed. The exudation increased after aging for one month. This confirms the observation of Stevenson (8) that exudation occurs particularly at high concentrations.

The TCPA ester shows a distinct advantage over the PA ester in permanence at elevated temperature. Table VIII shows the volatility of the PA ester to be 3 times as much as the TCPA ester at 250°F for 24 hours. No migration tests were made with

DIBUTYL ESTERS WITH NITROCELLULOSE

PLASTICIZER TO 100 NC	FILM T IN MILS	AVERAGE TS—PSI	±	% ELONGATION	±
DIBUTYL TCPA					
10	2.8	6710	200	2.4	0.2
20	2.0	7740	370	3.8	0.2
30	2.0	7670	350	2.8	0.6
40	2.0	7710	270	3.6	0.2
DIBUTYL PA					
10	2.0	7470	170	3.0	0.4
20	1.5	7310	400	3.2	0.4
30	1.5	5150	330	3.2	0.4
40	2.0	6270	200	5.6	0.4

Table VI

VINYLITE FORMULATION

FORMULA	A	B	C	D
VINYLITE V Y N W	66.97	62.21	57.45	62.21
STEARIC ACID	1.01	0.93	0.86	0.93
BASIC LEAD CARBONATE	2.06	1.86	1.72	1.86
PLASTICIZER	30.00	←DI-2-ETHYLHEXYL T C P A→ 35.00	40.00	DOP 35.00

CHARACTERISTICS

FORMULA	TS PSI	% ELONGATION	% SET	MODULUS 100% EL.	SHORE "A" HARDNESS
A	*	*	*	*	98
B	3090	285	100	2405	94
C	2820	295	68	1843	87
D	2775	320	39	1253	73

PERCENT LOSS IN WEIGHT AT 250° F.

HOURS	2	4	8	16	24
B	0.12	0.18	0.27	0.43	0.57
D	0.27	0.43	0.75	1.29	1.82

*SAMPLE TOO BRITTLE

Tables VII and VIII

the above materials but Stevenson (8) and Lawrence and McIntyre (5) have reported superior results with the di-2-ethylhexyl tetrachlorophthalate over the di-2-ethylhexyl phthalate in this respect. In view of the pronounced exudation, it was felt that fire retardant tests were not justified but from work which has been reported (8) and from theoretical considerations the TCPA ester would be superior to the PA ester.

In view of the many desirable properties of TCPA in these ester plasticizers it is felt that further studies are justified to increase the plasticizer efficiency and to prevent the exudation.

Conclusions

TETRACHLOROPHTHALIC anhydride may be used as the dibasic acid in conventional, oil modified alkyd resins. In comparison with phthalic alkyds the TCPA resins are darker in color and somewhat slower air drying but they have superior alkali resistance and fire retardant properties.

The color is improved by modification with a combination of maleic and oxalic acids but not to the extent necessary for use in finishes where pale original color and color retention with heat and age are very important requirements.

Although the TCPA alkyds have superior fire retardance than PA alkyds the necessary modification with oil reduces this property considerably. It would appear advantageous to study the possibility of replacing the oil with a fire retardant material in view of the demand for fire retardant paints.

A brief study of the dibutyl esters of TCPA and PA as plasticizers for nitrocellulose lacquers does not indicate much promise in this field particularly in view of the difficulty of flame-proofing nitrocellulose compositions.

The di-2-ethyl hexyl ester of TCPA has low volatility, does not migrate into surface finishes and has good fire resistance but it is not so flexible as D O P, and its exudation from the Vinylite V Y N W composition would make it unsatisfactory as a plasticizer.

Acknowledgements

Thanks are due to the Hilo Varnish Corporation for their cooperation and use of their laboratories, and to the late Dr. J. J. Mattiello for his advice and suggestions.

This work is part of the requirements for the Ph.D. degree in Chemical Engineering submitted by Mr. D. J. Mehta at the Polytechnic Institute of Brooklyn, Brooklyn, N. Y.

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* Presented at the Paint, Varnish and Plastics Division, American Chemical Society at the March, April 1949 meeting in San Francisco.

. . . STORING AND HANDLING

(From Page 12)

persons have worn such clothing during the past few years. Many have been exposed to flash fires, and the wearing of this clothing has prevented many serious burn cases. The flame-proofed clothing may be obtained from a number of concerns located in various cities in the country.

In some cases, solvents and diluents are handled in open push cans and similar containers. As a matter of fact, this practice is rather wide spread, but it ought to be avoided for several reasons; the wastage of solvent by evaporation, the increase in fire risk, and in some cases an added health hazard, because some of the solvents or diluents may be toxic.

If there is a continued use of the open type containers, several precautions need be observed; (1) the scale on which the container is weighed should have a non-sparking platform; (2) the platform ought to be grounded to a water pipe or other low resistance ground; (3) the solvent should be introduced into the vessel in a relatively solid stream; (4) the container should be kept covered with a light weight non-sparking covering; (5) the wheels of the scale ought to be non-sparking and conductive: (6) in dumping containers into the mixer, dissolver, or other vessel, the stream should be kept solid, so as to avoid static spray.

In many lacquer plants, mixed thinner is made up and packaged in containers of various sizes, and much the same precautions should be observed as discussed above. There is one additional feature worth mentioning, and it is the method of filling drums. A "slip" pipe should be used which will bring the fluid down close to the bottom of the drum, whether it be filled through the side bung or end bung. This "slip" pipe should be made of a non-sparking metal such as copper, brass, or aluminum. In many plants, nitrocellulose solution is pumped from the dissolver to storage tanks or other locations, and a positive type pump is frequently used.

A few accidents have occurred in the pumping of such solutions, and what is believed to happen is that a hard film forms in the pump stuffing box or in the space back of the impeller; and frictional heat causes decomposition of the film so rapidly that the relief valve doesn't function quickly enough; and the head of the pump is blown off. The possibility of such accidents can be almost entirely eliminated by the injection of a plasticizer in the pump stuffing box. This injection can be controlled automatically by the use of a pressure-type lubricator; thus, whenever the pump is operating, a small amount of plasticizer is injected at the required location, thereby preventing the formation of harm film. The same results can be accomplished by washing out the pump thoroughly after each handling, but it is probably cheaper and easier to use the plasticizer.

Fire Protection

A lacquer plant should be protected by means of an automatic sprinkler system for the protection it affords and also for the economies it brings about in insurance rates. It is not unusual for an insurance carrier to grant reductions of 50% and even more for the installation of an approved sprinkler system. This means that in many instances the premium saving will pay for the sprinkler system in a few years.

It is believed that a sealed head, thermostatically controlled sprinkler system will afford adequate protection in conjunction with other protection which should be provided.

Some may question the advisability of water sprinkler protection in a lacquer plant, but it is believed its advantage far outweighs the disadvantages. The chief disadvantage is the possible flow of burning material on the water.

If a sealed head system is used, the heads which open up would be those exposed to fire. It is true that many of the solvents and diluents are not miscible with water; however, the water discharged from the sprinkler heads acts to beat out a fire. Remember the water is not being discharged in a solid stream, but is cles; in this form, it tends to mechanibroken up into reasonably fine partically beat down a fire.

In addition to the sprinkler system, equipment such as nitrocellulose dissolvers, resin dissolvers, nitrocellulose solution storage tanks, lacquer mixers and resin solution storage tanks, and similar equipment should be fitted with fixed CO_2 protection. This means that a battery of CO_2 cylinders or other source of CO_2 is piped to the equipment mentioned. Each such piece of equipment is fitted with one or more horns or inlets. In the event of a fire, the CO_2 is discharged from its source of supply either by manual operation or automatic control, into the vessels, thereby quickly reducing oxygen content to a point below the combustible range.

A number of lacquer manufacturers have installed such equipment, and the systems have been called on to function in a number of instances. The performance has been excellent; in many cases, fires have been extinguished with very little damage or loss. There also should be a number of CO_2, dry powder, or other suitable first-aid fire extinguishers. The size and number required will vary with the plant; however, it is probable that the 20 pound unit is a desirable size.

If there is a large storage of solvents and diluents on the plant, it will probably be desirable to provide other protection, such as a supply of foam powder or foam solution with suitable equipment for utilizing whichever is selected, and possibly a 750 pound CO_2 wheeled type extinguisher or a 350 pound dry powder type extinguisher. In selecting the foam powder or foam solution, be sure to obtain a material which is effective on lacquer solvents. Some of the foams are soluble in lacquer solvents, and therefore, may not be too effective.

A study of the plant requirements needs to be made and a decision reached as to the indicated size, kind, and number of first-aid extinguishers; however, it is probable that for the sake of simplicity only one kind and make of extinguisher should be ordered and installed. Also, all persons who may be called on to use such equipment should be trained in its use. Fires should be built at a safe and suitable location, and the employees of the plant should be trained to put out such fires with the first-aid fire equipment installed on the plant. It is not enough to buy and install the equipment; it is essential to have people trained to use the equipment. Such training will pay good dividends.

It is also desirable that there be several fire hydrants near the lacquer plant. These may be Fire Department hydrants and outside the limits of the plant property. If they are conveniently located, this should be entirely satisfactory; however, in some cases the hydrants are installed on the plant property, and certain members of the plant organization must be trained to use fire hose.

In the foregoing, a number of the features and items having to do with safety in the manufacture of lacquer have been discussed. It may seem to some that there is a multitude of details. However, all of the items have not received consideration, but only those which appear to be worth mentioning at this time. Some of the items not mentioned may be equally important, and it should not be assumed that all matters of importance were covered.

The point is that safety in the manufacture of lacquer can be achieved by paying attention to the many necessary details, and is the only way by which accidents can be prevented in any line of production.

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Crown Oil, A. J. Wittenberg Merge

A. J. Wittenberg, president, announced the merger of the Crown Oil Products Corp. and the A. J. Wittenberg Corp. to form the Crown-Wittenberg Chemical Corporation.

The new company will occupy the offices, laboratories and manufacturing facilities of the Crown Oil Products Corp., located at 2–14 49th Ave., Long Island City. The Crown-Wittenberg Chemical Corp. will continue the production of alkyds, treated drying oils and hard resins, and in addition, will market natural resins and rosin products.

Mr. Wittenberg, who will head the new company, has a wide acquaintance among paint, varnish, linoleum, printing ink and textile manufacturers, which industries form the principal outlets for his products.

He is also president of Synthetic Resins, Inc., of Valdosta, Ga., director and vice president of American Gum Importers Laboratories and a member of the American Chemical Society, N. Y. Produce, Union League and Downtown Athletic Clubs.

. . . LITERATURE SURVEY

(From Page 9)

4. Archer-Daniels-Midland Company, Technical Bulletin #50, "Kaysoy 22."

Kaysoy 22 is a modified soybean protein derivative. It is a relatively low-cost form of protein, with special advantages in water dispersible, dry powder paints. Suggested formulations are given based on Kaysoy 22 and hydrated lime with titanium dioxide and lithopone in combinations with clay, barytes and magnesium silicate as extender pigments. Pine oil is suggested as an anti-foam agent.

5. Archer-Daniels-Midland Company, Technical Bulletin #54 "Kaysoy 12"

This material is a soybean product containing 50% protein and 33% carbohydrates which can be used to supplement or replace casein in typical oil emulsion paints. It is lower in price than casein.

Suggested emulsion formulations are based on heat bodied linseed oil with a high ratio of Kaysoy 12 or Kaysoy 12-casein combination. Sodiumfluoride and borax are used as emulsifiers and solubilizers with Dowicide G as preservative and pine oil as antifoaming agent. Lead and cobalt naphthenates are used as driers. Suggested pigmentations are based on lithopone and China clay with and without titanium dioxide.

6. Archer-Daniels-Midland Company, Technical Bulletin #63 "Trimol 80."

Trimol 80 is a water soluble linseed oil which loses approximately 20% on heating for 3 hours at 245° F. Suggested formulations show that it may be used with or without proteins.

A protein free water-paint uses a combination of Trimol 80 and a 20 gallon ester gum-linseed oil varnish with a small amount of ammonia. Methocel solution is used for viscosity adjustment and pine oil as anti-foam agent. This vehicle is pigmented with titanium dioxide, lithopone, mica and China clay.

Another suggestion is based on Trimol 80 and casein with ammonium alginate as thickener, Antifoam A and pine oil as anti-foam agents and Dowicides A and G as preservatives. The pigment combination is the same as given above. Lead and cobalt driers are added as linoleates. These suggested formulations were designed to meet the requirements of Federal Specification TT-P-88.

7. Armour & Co. booklet, "The Chemistry of Fatty Amines"

Fatty amines are normal aliphatic amines whose alkyl groups contain from 8 to 22 carbon atoms. The high molecular weight alkyl amines having branched instead of normal chains are not considered to be fatty amines. The fatty amines are sold under the trade name of Armeens and are available with either saturated alkyl chains. The fatty amines react with organic carboxylic acids to form substituted ammonium salts. When reacted with acetic acid they form fatty amine acetates which are cation-active surface active agents sold under the trade name of Armacs. These materials are useful for changing the conditions at the pigment-vehicle interface.

8. Armstrong, W. C. & Piquet, D. A. Official Digest page 3, June 1945

This article gives a detailed comparison of the effects of varying the pigment volume concentration in both the emulsion type and the oil type of flat white paint. The emulsion paints are based on a 50-gallon ester gum-linseed oil varnish, emulsified with ammonia soaps and stabilized with casein in the ratio of 25% casein to emulsion solids. The oil type paints are based on a 50-gallon ester gum-lined linseed oil varnish. The two pigmentations were: titanium dioxide with mica and lithopone with mica both in an 85 : 15 volume ratio. The paints were tested for penetration, enamel hold-out, gloss, color, hiding, wet abrasion clean-up, etc. Details of tests and results are given and conclusions are drawn. One general conclusion is that there was an improvement in the general quality of the paints as the pigment-volume concentration was lowered.

12. Bakelite Corporation. Polystyrene Emulsions BKS-92 and BKS-90

Polystyrene emulsion BKS-92 is a general purpose emulsion of plasticized polystyrene. For greater flexibility plasticizers such as dibutyl or dioctyl phthalate or dibutyl sebacate may be added and, where greater hardness is desired, some BKS-90 may be blended with the BKS-92. Emulsion BKS-90 forms, a powder on drying and not a continuous film. BKS-92 is compatible with casein and several other water dispersible film formers. Three compounds are suggested to control foam formation; Anti-Foam A (Dow Corning), Foamex (Glyco Products) and a 50: 50 blend of tributyl phosphate and octyl alcohol. Several deodorants are also suggested.

Films of polystyrene emulsions have excellent chemical resistance and, when pigmented with alkali resistant pigments they are suitable for a sealer coat over "hot plaster." They are also satisfactory for a shop coat on asbestos-cement shingles and rough-textured fiber wallboards. Pigmentations are given for Flat White, Semi-gloss White and Green Semi-Gloss emulsion paints. A 50: 50 mix of Ti02 and china clay is used in the white. Recommended grinding procedure after mixing is two passes through a buhrstone mill, set loosely. Drying time for the white or green is about 20 minutes.

13. Bakelite Corporation, Technical Data on C-9 Resin Emulsions.

This literature describes the methods of preparation of both water-in-oil and oil-in-water type emulsions using the C-9 resins in combination with drying oils as the principal film forming component. Ammonia or morpholine with linseed fatty acids are suggested as the emulsifying agents, with casein as the stabilizer, ammonium alginate to regulate viscosity and Dowicides A and G as preservatives. Pigmentations are given for flat white and colored emulsion paints.

15. Carbide & Carbon Chemical Corporation, booklet "Emulsions"

This booklet gives the general principles of formulation and manufacture of emulsions. It gives an excellent description of various amines and amine soaps as emulsifiers. It

also describes the Tergitol wetting agents as emulsifiers. Tergitol wetting agent #7 is a 25% aqueous solution of the sodium derivative of 3,9-diethyl-tridecanol-6 and Tergitol #4 is a 25% aqueous solution of the sodium derivative of 7-ethyl-2-methylundecanol-4. The Tergitols are more stable than the amine soaps to dilute acids and alkalies.

16. Church, J. W. Official Digest, February 1945

An emulsion paint is described which contains mineral spirits. This appears to defeat one of the purposes of emulsion paints, i.e., the elimination of organic solvents. The suggested formulation also contains Carbitol to eliminate "an oily float resulting in unevenness of sheen at the brush marks." Carbitol is soluble in both oil and water and, in general, such materials markedly lower the stability of emulsions.

17. Commercial Solvents Corporation, booklet "Emulsifying Agents."

This booklet describes the amino-hydroxy derivatives of the nitro-paraffins as emulsifying agents. These are of special interest when it is necessary to make protein free emulsions. The 2-amino-2-methyl 1-propanol has been used successfully in emulsion paints. These materials are used in combination with an acid such as oleic or stearic. The acid is dissolved in the oil phase followed by the normal emulsification procedures.

17a. Dow Chemical Co., Technical Bulletin Dow Latex 512.

Dow Latex 512 is an emulsion of a copolymer of styrene and butadiene and it represents another development in the use of high polymers for paints. The copolymer contains some unsaturation and its films will absorb oxygen and become progressively harder with age. Small amounts of anti-oxidants are suggested to keep the film soft and rubbery. Conversely regular driers or baking schedules may be used to obtain very fast drying. The latex may be used as is for the binder in flat wall paints or it may be blended with certain emulsified drying oils and resins. Water soluble cellulose derivatives, starch, clays, etc. may be used as thickening agents.

Most pigments may be used with Dow Latex 512 but the addition of tetrasodium pyrophosphate is suggested in some cases to prevent coagulation. It is recommended that the pigments be made into a paste with the water phase and then the latex mixed in slowly.

18. Du Pont Company, Technical Bulletins on Emulsion Paints

One bulletin describes the advantages of the rutile type of Ti02 over the anatase type for emulsions paints. It also shows the advantages of using a proportion of lithopone and extender pigment in the pigment content. Asbestine 5X or equivalent is suggested as the extender. A specific pigment combination is suggested to meet the requirements of Federal Specification TT-P-88.

Bulletin No. 290 describes an emulsion and pigmentation to meet Spec. TT-P-88. The oil phase of the emulsion is a 50-gallon ester gum-linseed oil varnish. Casein is suggested as the stabilizer in a ratio of about one casein to three of varnish. Ammonium soap of linseed fatty acids is the emulsifying agent, pine oil and Anti-Foam H are the anti-foaming agents and Dowicides A & G are the preservatives. Duponol ME or Naccanol NR are suggested as wetting agents and Pb and Co linoleates are used as driers. An alginate such as Superloid of the Kelco Company is suggested as the consistency regulator.

The test methods and values obtained with the suggested formulation are given. The results obtained with various materials used in the development of the formula are also given.

19. Elm, A. C. and Werthan, S. Official Digest, February 1943.

This is an excellent article on the basic principles of emulsification, the types of materials used in emulsion paints, the application and film properties of emulsion paints and the methods of test.

19a. "Emulsion Technology" Chem. Pub. Co. 1946.

This book embodies the papers presented at a symposium on emulsions held by the British Section of the International Society of Leather Trades Chemists. It includes an interesting paper on Emulsion Paints by S. Werthan of the N. J. Zinc Company which, in addition to giving the general principals, illustrates the use of the microscope in emulsion evaluation.

20. Falk & Company, Technical Bulletins, "Water Paints."

Formulations are suggested for emulsion paints which may be thinned with mineral spirits, turpentine or water. These paints are based on Falkoloid #100 and #200 which are processed fish oils containing 85–87% solids. In addition to Falkoloid the emuslion contains oleic acid, 28% ammonia, 50% caustic soda solution, 18% sodium hexametaphosphate, 2% methocel together with mineral spirits, carbitol and water. Lead and cobalt are added as naphthenates. The pigment combination is lithopone, china clay and Surfex. It will be noted that this formulation contains organic solvents which introduce both odor and fire hazard.

21. Frick Friedrich, U. S. Pat. 2,178,474 and 2,178,475.

These are broad patents covering the use of alkyd resins in emulsion paints. They were applied for on December 5, 1929 and March 19, 1931 and both were issued on October 31, 1939.

22. Georgia Kaolin Company, Technical Bulletin "Hydrite"

This bulletin describes an extender pigment known as Hydrite which is a hydrated aluminum silicate of controlled particle size. It is especially designed for water thinned paints.

Suggested formulations are based on a combination of Trimol #80 and a 40-gallon ester gum-linseed oil varnish as the film former. Casein is added with ammonium alginate as the thickener, Dowicides A and G as preservatives, Anti-Foam H and pine oil as anti-foam agents. The pigment combinations contain titanium dioxide, zinc sulphide, lithopone, mica, diatomaceous silica and Hydrite.

23. The Glidden Company, Booklet, "Industrial Soya Proteins."

This describes soybean development and research and four types of soya proteins. The alpha protein which is obtained by solvent extraction is practically a pure protein. The gamma protein, obtained by mechanical methods contains about 55% protein, the remainder being

carbohydrates, sugars, etc. These materials are of interest with or as a replacement for casein in emulsions which contain proteins.

23a. Goodyear Tire & Rubber Co., Chemigum Latex 101.

Chemigum Latex 101 is the most recently announced emulsion of a Buna S type copolymer for use in paints. It is a 45:55, butadiene: styrene copolymer sold at a 55% ± 2% solid content. Suggested formulations for flat and semi-gloss wall finishes use titanium dioxide, lithopone and mica as pigments, alpha protein as emulsifying agent, sodium pentachlorophenate for preservative and Davan #1 and tetrasodium pyrophosphate as wetting agents. Specific manufacturing directions are given to obtain best results. The emulsion paints may be packaged thinned down ready for use if desired.

24. Hercules Powder Company, Booklet, "Emulsifying Process for Rosin Size."

A description is given of an automatic emulsifying process for the manufacture of rosin size used in the paper industry. No information is given regarding its possible value in the manufacture of resin emulsions for paint use.

25. Hirsch, Eugene U. S. Pat. 2,372,577.

This patent, applied July 23, 1941, issued March 27, 1945 describes methods for producing gloss emulsion paints.

26. Iddings, Carl, American Paint Journal, April 9, 1945.

Dr. Iddings has many years of experience in the formulation, production and use of water paints. In this article, "Water Paints in the Post-War Era," he discusses the development of this industry, the present status of resin emulsion paints and the future possibilities in this field. He points out the advantages of emulsion paints for interior household use and offers the interesting suggestion that emulsified lacquers may be an important item for this purpose in the future.

29. Kelco Company, Technical Data, "Keltex and Superloid."

Keltex is sodium alginate, and Superloid is ammonium alginate and they are used as stabilizers for casein and casein-resin emulsion paints. They are dry powders which are dispersed readily in hot or cold water. They act as consistency regulators and tend to maintain a better brushing consistency when the paste paint is reduced with water. The two types, sodium and ammonium, permit a choice of the one most suitable for the particular emulsion. They are widely recommended as protective colloids for many types of emulsion as well as for emulsion paints.

30. Metro-Nite Company, Technical Data

Metro-Nite is a white, extender pigment. It is suggested in a bulletin of the Bakelite Corporation for use with titanium dioxide as the pigment combination for White Emulsion Paint.

31. Meyers, R. J. and Cheetham, H. C. U. S. Pat. 2,220,685 November 5, 1940

This patent covers a high solid content, revertible water-in-oil type of emulsion of a drying oil modified alkyd resin.

32. The Neville Company, Technical Data "Nevilloid C-55."

Nevilloid C-55 is an emulsion of a coumarone-indene resin containing 65% solids by weight. It is compatible with emulsions of waxes, Trimol 80, melamine resins and alkyd resins. It may be pigmented with the usual pigments used in emulsion paints.

33. New Jersey Zinc Company, Technical Service Bulletins Emulsion Paints

These bulletins describe several pigmentations of three emulsions. The principal film former is a 10 gallon bodied linseed-ester gum varnish. Casein is used in only one of these emulsions, the other two use methyl cellulose as the stabilizer. In one of the emulsions the varnish is thinned with mineral spirits. The emulsifying agent is based on 2-amino-2-methyl-1 propanol with oleic or linseed fatty acids. Pine oil is used in two cases and a list of preservatives is given. The usual 6% cobalt and 24% lead driers are suggested.

The pigmentation includes combinations of lithopone and zinc sulphide with the extenders, diatomaceous silica and china clay.

34. O'Brien, W. J. Protectivie & Decorative Coatings Volume III Chap. 15

This chapter described the alpha and gamma proteins and their production from soybeans. The alpha protein is solvent extracted and is practically pure protein (96–97%). The gamma protein is obtained by mechanical means and contains 50% to 55% protein and a large percentage of carbohydrates. Both materials find use in water paints.

35. Radcliffe, R. S. Protective & Decorative Coatings, Volume III Chap. 15

This chapter, "Casein Paints", contains an excellent description of the history and development of casein paints. It includes dry powder paints, casein paints and emulsion paints containing casein.

36. Rohm & Hans Company, Technical Bulletins on Emulsion Paints.

This is the only literature in our bibliography which describes the use of a commercially available alkyd resin emulsion. The white pigmentations for Aquaplex emulsion are based on the titanium and zinc sulphide pigments with mica and silica as extenders.

37. Stieg, F. B. Official Digest 1945.

These papers describe emulsion paints based on the use of titanium pigments. The flat finish emulsion principal pigment, avoids the use of paint, with titanium calcium as the casein because of its reactivity with calcium compounds. An emulsifying system is suggested based on sulphonated castor oil, sodium soap of fatty acids and a monionic agent. A gloss finish emulsion paint is suggested based on titanium dioxide with a short-oil ester gum varnish as the binder and the above emulsifying system. An interesting feature of the gloss emulsion formulation is that it suggests grinding the pigment in the oil phase before emulsifying. With this procedure it is not necessary to use a water dispersible type of titanium dioxide or one which has been coated with an amphoteric metal compound.

38. Sutheim, G. M. Chemical Industries p. 948, June 1947.

Mr. Sutheim is a recognized authority in the emulsion field and this article is an excellent presentation of the principles of emulsions not only for paint but also for other fields such as textiles, etc. The article contains a very good bibliography of 55 references.

39. Sutheim, G. M. "Introduction to Emulsions", Chem. Pub. Co., 1946.

This is an excellent text on the general subject of emulsions.

40. Sutheim, G. M. Protective & Decorative Coatings, J. J. Mattiello, Vol. IV, Chap. II

This chapter gives in detail the theory of emulsification, the chemistry of emulsifying agents, types available and the general principles of emulsions and emulsion paints. The subject is presented unusually well and the chapter contains a bibliography of 80 references. The subject is covered in even greater detail in Mr. Sutheim's book, "Introduction to Emulsions," Chemical Publishing Company.

40a. Titanium Pigment Company, Technical Data Emulsion Paints.

The data and suggested formulations illustrate the precautions necessary for the use of titanium calcium pigments in emulsion paints. The film formers are a 40 gallon and a 16 gallon ester gum-linseed oil varnish. The other ingredients are sulfonated castor oil, NaOH solution, methyl cellulose and, in one case, a starch dispersion. Two emulsifying or wetting agents are suggested, Igepal CPA (General Dyestuffs Corporation) and Wetting Agent C (Advance Solvents & Chemical Corporation) or similar ones which are suitable for use with calcium base pigments.

The pigment combinations are based on rutile titanium dioxide and the calcium modification with diatomaceous silica as the extender.

41. U. S. Dept. of Commerce, National Bureau of Standards, Circular Letter LC-915

This letter is dated September 13, 1948 and is titled "Painting Exterior Walls of Porous Masonry." It discusses Cement-Water Paints, Resin-Emulsion Paints, Oil Paints, Paints Containing Synthetic Rubber and Whitewash. It discusses the preparation of the surface and the mixing and application of the paint. Copies can be obtained without charge from the National Bureau of Standards, Washington, D. C.

42. R. T. Vanderbilt Company, Technical Data, "Darvan #1 and #2."

The Darvans are complex polymerized organic salts of sulfonic acid of the alkyl-aryl type. (A very broad statement). They are used to assist the dispersion of pigments. Since they do not lower the surface tension appreciably they are not considered as wetting agents in the ordinary sense of that term.

43. Young, C. B. F. & Coons, K. N. "Surface Active Agents" Chemical Publishing Co.

This book gives much useful information regarding methods for measuring surface tension, and a detailed description of the types of surface active agents. It also contains an extensive list of these agents. There is a valuable section on emulsions but it describes principally the emulsions used for other than paint use. This includes leather, textiles, metal cleaning, cosmetics, etc.

PATENTS

Conducted by

Lancaster, Allwine & Rommel

PATENTS, TRADEMARKS AND COPYRIGHTS

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Copolymerization Process

U. S. Patent 2,490,489. Ernest J. Tauch, Cleveland Heights, Ohio, assignor to E. I. du Pont de Nemours & Company, Wilmington, Del., a corporation of Delaware.

In a process in which styrene containing polystyrene and maleic anhydride are copolymerized in xylene solution and the copolymer is hydrolyzed in aqueous alkali solution, the steps comprising copolymerizing the styrene and maleic anhydride adding water and an amount of alkali not greater than one-tenth of the total amount of alkali required to hydrolyze and neutralize the copolymer to a pH of from 4.8 to 5.7, measured in a 25 per cent aqueous solution, removing all of the xylene from the mixture, and thereafter hydrolyzing and neutralizing the copolymer to a pH of 4.8 to 5.7, measured in a 25 per cent aqueous solution, by digestion with additional alkali.

Alkyl Polysilicates

U. S. Patent 2,490,691. Carl M. Langkammerer, Wilmington, Del., assignor to the E. I. du Pont de Nemours & Company, Wilmington, Del., a corporation of Delaware.

A method for preparing a fluid polymeric silicic acid ester which consists in heating under reflux a tetraalkyl orthosilicate with from one-half to two molar equivalents of an anhydrous unsubstitued saturated lower aliphatic monocarboxylic acid containing from 2 to 4 carbon atoms.

Cellulose Esterification

U. S. Patent 2,489,382. Mervin E. Martin and Troy M. Andrews, Cumberland, Md., assignors to Celanese Corp. of America, a corporation of Delaware.

Process for the production of cellulose propionate of improved physical properties, which comprises esterifying cellulose with an esterification mixture comprising propionic acid in an amount sufficient to effect the esterification, propionic acid anhydride and an esterification catalyst, adding to the reaction mixture just before the completion of esterification, and when the cellulose propionate contains from 2.75 to 2.95 propionyl groups, more propionic acid in an amount at least equal to that originally employed for the esterification of the cellulose, continuing the esterification until the reaction mixture is substantially clear, precipitating the cellulose propionate from solution in fibrous form and washing it free of acid.

Siloxanes

U. S. Patent 2,490,357. James Franklin Hyde, Corning, New York, assignor to Corning Glass Works, Corning, N. Y., a corporation of N. Y.

The method of preparing diorganosiloxane polymers which comprises contacting cyclic diorganosiloxanes in which all of the organic radicals are selected from the group consisting of alkyl and monocyclicaryl radicals, at least some of the organic radicals being alkyl, with an alkali metal hydroxide in amount from 1 alkali metal atom per 10,000 silicon atoms to 1 alkali metal atom per 15 silicon atoms, at a temperature below that at which the destructive distillation would occur and until an increase in the molecular aggregation is effected.

Polypentaerythritols

U. S. Patent 2,490,567. Joseph A. Wyler, Allentown, Pa., assignor to Trojan Powder Company, Allentown, Pa., a corporation of New York.

The process for the preparation of polypentaerythritols which comprises adding acetaldehyde and potassium hydroxide solution gradually and substantially concurrently to a formaldehyde solution containing at least 27% formaldehyde by weight, the amount of water in the system at the completion of the addition of the acetaldehyde and potassium hydroxide solution not exceeding about 60% by weight; reacting the acetaldehyde with the formaldehyde and stirring the reacting mixture until the reaction is substantially complete and polypentaerythritols have precipitated from the aqueous solution; and separating the precipitated polypentaerythritols from the solution.

Cellulose Acetate

U. S. Patent 2,487,892. George A. Richter and Robert H. MacClaren, Rochester, N. Y., assignors to Eastman Kodak Company, Rochester, N. Y., a corporation of New Jersey.

A method for preparing cellulose acetate having good haze characteristics which comprises sucking water through fibrous cellulose in sheet form to swell the cellulose fibers, followed by sucking concentrated acetic acid through the sheet to displace substantially all of the water therefrom, and subsequently sucking through the sheet a 1–3% solution of sulfuric acid in acetic acid to uniformly distribute the sulfuric acid through the cellulose, mixing the resulting cellulose with acetic anhydride and subjecting the mass to esterifying conditions whereby the cellulose is converted to cellulose acetate.

Vinyl Plasticizers

U. S. Patent 2,489,674. Ernst P. Rittershausen, Hempstead, N. Y., assignor to Socony-Vacuum Oil Company, Incorporated, a corporation of N. Y.

A composition of matter comprising a vinyl resin and a thiophene polymer having a molecular weight from about 200 to about 500.

Polyester-Polyamides

U. S. Patent 2,490,003. David W. Jayne, Jr., Old Greenwich, Harold M. Day, Cos Cob, and Edward L. Kropa, Old Greenwich, Conn., assignors to American Cyanamid Company, New York, N. Y., a corporation of Maine.

A process which comprises bringing about reaction between a primary straight chain monoalkylolamine of the formula HO—Y—NH_2 in which Y is a divalent, straight-chain, saturated aliphatic hydrocarbon radical, a saturated aliphatic hydrocarbon dicarboxylic acid which does not form an anhydride upon heating and a polyfunctional compound selected from the group consisting of aliphatic hydrocarbon polyhydric alcohols containing at least three hydroxyl groups, aliphatic hydrocarbon polyamines having at least three amino groups with a hydrogen atom attached to each amino nitrogen atom and aliphatic hydrocarbon amino alcohols containing at least three hydroxyl groups and amino groups with a hydrogen atom attached to each amino nitrogen atom, the molar ratio of dicarboxylic acid to monoalkylolamine being from 1:0.6 to 1:1, that of dicarboxylic acid to polyfunctional compound being from 1:0.05 to 1:0.2 and that of dicarboxylic acid to total monoalkylolamine and polyfunctional compound being from 1:0.8 to 1:1.1, and curing the reaction product by heating.

Recovery of Pyridine

U. S. Patent 2,487,874. Francis C. Huber, Riverton, N. J. assignor to Allied Chemical & Dye Corporation, New York, N. Y., a corporation of New York.

A process for the recovery of a pyridine carboxylic acid from a reaction mixture containing said acid in admixture with a strong inorganic acid, which comprises drowning said reaction mixture in water, adding copper oxide to the resulting mass after at least a substantial portion of the reaction mixure has been drowned and in such amount that the pH value of the drowned mass does not exceed about 0.2 removing insoluble matter from the drowned mass, adjusting the pH value of the drowned mass to between about 2.5 and about 7.0 to precipitate the copper salt of the pyridine carboxylic acid, separating the copper salt of the pyridine carboxylic acid from the reaction mass and reacting said salt with an aqueous caustic alkali to form the alkali metal salt of the pyridine carboxylic acid and copper oxide, and recycling the copper oxide thus formed to the drowning operation.

Linear Polyvinyl Acetals

U. S. Patent 2,487,864. Cecil W. Gayler, Ridley Park, Pa., assignor to American Viscose Corporation, Wilmington, Del., a corporation of Delaware.

A linear polyvinyl acetal resulting from the condensation of a polyvinyl alcohol selected from the group consisting of polyvinyl alcohols containing no ester groups and polyvinyl alcohols containing up to 10% of ester groups and an aldehyde selected from the group consisting of formaldehyde, acetaldehyde, trioxymethylene, and paraldehyde, in suspension in an initially anhydrous non-polar medium consisting of 1,4-dioxane in the presence of hydrogen chloride gas distributed through the medium and in the absence of external heat and pressure.

Pigmented Styrene

U. S. Patent 2,489,226. Earl D. Morris and Stevens S. Drake, Midland, Mich., assignors to The Dow Chemical Company, Midland, Mich., a corporation of Delaware.

A process which comprises adding, to a liquid of the class consisting of styrene and solutions of polystyrene in styrene, polystyrene and a styrene-insoluble pigment which is stable to decomposition at temperatures up to 200° C., the pigment being incorporated together with at least a portion of the added polystyrene having from 10 to 25 per cent by weight of the pigment dispersed therein and said color concentrate being in amount corresponding to between 0.5 and 10 percent of the weight of the entire mixture, dissolving in the styrene and polystyrene added as such and in admixture with the pigment to form a liquid composition containing polystyrene in amount sufficient to give the composition a viscosity of at least 35 centipoises at 25° C. and having the pigment uniformly dispersed therethrough, and thereafter subjecting the composition to polymerizing conditions until the styrene is polymerized to a solid.

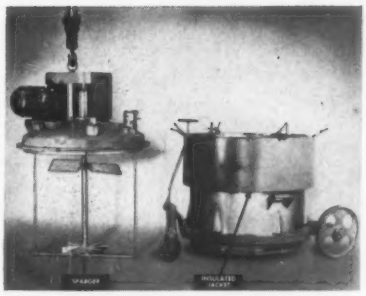
Recovery of Oils

U. S. Patent 2,486,385. John W. Beckman, Oakland, Calif., assignor to Marian O. Palmer, Oakland, Calif.

In a fermentation process for release of oil from organic materials, the steps consisting of complete reduction of the material to particles of a microscopic but multicellular size while avoiding any substantial rupture of the cells, and thereafter subjecting to a controlled enzymatic fermentation for release of the oil from the cells.

NEW PRODUCTS & IMPROVEMENTS

A MONTHLY MARKET SURVEY



BRIGHTON COPPER

KETTLE ACCESSORIES

Sparger and Jacket

Two brand new features have been added to Brighton's popular "Low Boy" Kettle. The new Porous Stainless Steel Sparger gives more uniform sparging of the inert gas. It is a porous stainless steel block unit placed immediately below the turbine agitator. A quality piece of equipment in design and fabrication. The Insulated Jacket on kettle shell and cover is also a new feature.

Uniformity of products can be maintained more easily and at a very nominal expense. Metal Jacket surrounding the fireproof insulation can be quickly removed.

Brighton maintains a complete engineering staff, and a plant capable to fabricate your large or small equipment. Brighton Copper Works, Inc. Brighton Station, Cincinnati, Ohio. PVP—January.

RUST INHIBITOR

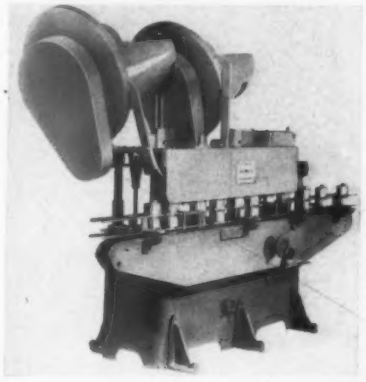
For Pipes and Tanks

A hydrocarbon-soluble, water-insoluble, non-metallic organic material, sold under the trade name "Santolene C" is intended to be used as a rust inhibitor for light oil products, such as fuel oil, gasoline, kerosene etc. in pipe lines and static storage. According to the manufacturer, the new product is sufficiently effective at a dosage of 0.002 per cent by weight, or 75 gallons per 1,000 barrels, when tested against distilled water. Concentrations up to 0.01 per cent may be necessary against sea water. Monsanto Chemical Co. St. Louis, Mo. PVP—January.

CAPPING MACHINE

Fully Automatic

Research and development on behalf of the Hercules Powder Co. and the Resina Automatic Machinery Co., Inc. has resulted in a full scale production of fully automatic capping and banding machine. The containers and cans go right into the capper and bander directly from the filling machine without the aid of human hands. Designated the Resina U-Press-it machine, it is easily adjusted to change over from one size to another and can handle pint and quart sizes at the rate of 85 per minute, and gallon cans up to 40 per minute. Resina Automatic Machinery Co., Inc. 572 Smith St., Brooklyn, N. Y. PVP—January.



RESINA

SAFETY TRUCK

Tilts Drums

The problem of easily and safely positioning and moving heavy drum loads of paints, lacquers, chemicals, emulsions and all types of liquids and semi-liquids into the most convenient place for side dispensing of contents into smaller containers is solved by this "Rock-A-Drum" truck.

Where mass production spray or dip painting or lacquering is employed or where a supply of any liquid must be constantly at hand, this truck becomes an important factor in the production process. It is the means of having a constant, adequate supply of the liquid located on the production line at all times. Transporting heavy drum loads from the storehouse or from distant locations in the plant to the place of actual usage and ready for dispensing is accomplished with "Rock-A-Drum". Morse Mfg. Co., Inc. 122 Dickerson St., Syracuse 2, N. Y. PVP—January.

MORSE

NEW PRODUCTS

FISHER SCIENTIFIC

ANALYTICAL BALANCE
Speed in Operation

Weighing pigments and samples to 1/20 of a milligram with analytical balance accuracy, but in one-third of the usual time is made possible by a new direct-reading instrument called the "Gram-atic Balance".

The new balance has only one pan, and the weight reads directly on a scale at eye level, eliminating a usual source of error in adding up individual weights. The balance has all required weights built-in and manipulated by turning four external knobs. No weights are handled, weights less than 0.1 gram are indicated optically and automatically. Total weight is read directly from a scale on the instrument panel. The sample to be weighed can range from 200 grams (approx. 7 ozs.) to 0.0001 gram. Fisher Scientific Co., 717 Forbes St., Pittsburgh 19, Pa. PVP—January.

CONSTANT TEMP. BATH
For use with Ford Cup

Dual constant temperature both, constructed of stainless steel, is designed for use with No. 4 Ford Viscosity Cup as well as for general constant temperature work. The shallow end of the bath contains two tubes passing through the bath, which are designed to retain one aluminum Ford cup and one brass receptacle for preheating the material to be measured. Over-all dimensions 22″ long × 9″ wide × 8½″ deep. It contains a thermo regulator pre-set to maintain temperature of 77° F. ± 0.2°, and a built-in switch with pilot light, and stainless steel control panel cover. Henry A. Gardner Laboratory, Inc. 4723 Elm St., Bethesda 14, Md. PVP—January.

ROTATIONAL VISCOMETER
Wide Range

Viscometer measures and records viscosity from .001 to 1,000 megapoises at various rates of shear. It is designed primarily for testing roofing, paving, and water-proofing products. It can be used for measuring the viscosity of paints, varnishes, adhesives, plastics and similar materials. Temperature may be controlled within 0.1° C at any point from 20 to 100° C.

The sample cup is rotated, causing a viscous drag on stator immersed in

PRECISION SCIENTIFIC

the sample and the resultant torque is recorded by a Brown recorder through Statham Strauss gauge. Precision Scientific Co. 3737 W. Cortlant St., Chicago, Ill. PVP—January.

ORGANIC FLUORIDES
For Polymerization

Ten organic fluorides are available in research quantities for investigation as possible polymers containing stable fluorine groups. Each compound contains a double bond and one or more fluorine atoms. These compounds permit selection of a particular compound which contains desired ratio of fluorine to chlorine, hydrogen, or carbon. All compounds are liquids at 20° C. Boiling points range from 35.1° C to 114.4° C. Halogen Chemicals, Inc., 616 Kings St., Columbia 5, S. C. PVP—January.

SKIN CREAM
Prevents Dermatitis

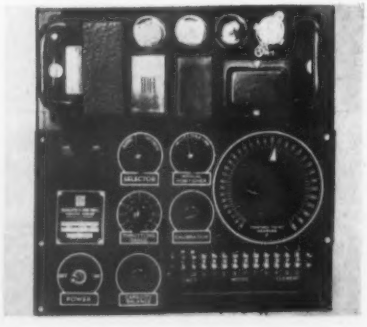
Cream is said to protect skin against paints, printing inks, lacquers, etc. "Clov-Cote" acts like a glove over the hands and arms; forms a protective coating that washes off easily even in cold water. Samples are obtainable from Chase Chemical Co., 2901 Dover Ave. Cleveland, Ohio. PVP—January.

TEMPERATURE CONTROL
Wide Range

Electronic control instrument for industrial applications is sensitive to temperature changes as small as one-tenth of one degree, according to the manufacturer.

The new device will control industrial processing temperatures in which the temperature range is between 20 degrees below zero and 300 degrees above. It operates on the principle that resistance of a wire-wound sensing element varies in proportion to the temperature of the control medium. The sensing element forms one leg of a Wheatstone bridge circuit so that any minute change in temperature causes the bridge to become unbalanced and permits current to flow. Electrical unbalance of the bridge is imposed on an electronic amplifier which amplifies and detects the direction of unbalance to operate either of two output relays, according to the direction of temperature change. The two relays control a motor. Minneapolis-Honeywell Regulator Co., 2753 4th Ave., S. Minneapolis, Minn. PVP—January.

MINNEAPOLIS-HONEYWELL



NEW PRODUCTS

ALKALI-SOLUBLE RESIN
Fungi Resistant

Lustrex X-810 is a ground powder which is soluble in aqueous alkaline solutions, ketones, esters and alcohols. Alkaline solutions are viscous and viscosity depends upon concentration and pH. Films are said to be highly resistant to bacteria and fungi. Air-dried films are brittle and slightly yellow, and can be made water-resistant by adding heavy-metal salts or treating with dilute organic acids. This copolymer is insoluble in water, acids and aliphatic and aromatic hydrocarbons. Some physical properties of this resin are: specific gravity 1.27 at 25° C, softening pt., 180° C, decomposition temperature, 210° C.

Recommended uses are for production of coating films, emulsifier, protective colloid, thickening agent, binder and for formulating adhesives. Monsanto Chemical Co., St. Louis 4, Mo. PVP—January.

ACRYLIC RESINS
Aqueous Dispersions

Non-ionic, acrylic type emulsion is designed for use where other aqueous dispersions have been impractical bcause of mechanical stability.

The coatings are designated Rhoplex WN-75 and Rhoplex WN-80, Rhoplex WN-75; can be desposited in continuous films at low coating weights, even when dried at room temperatures. It may be employed in emulsion paints for porous surfaces, and in coatings for many other surfaces, particularly where greaseproofness is important.

Emulsion WN-80 is particularly useful when clear, continuous, almost colorless greaseproof films are desired, as in coatings for paper, cloth and other fibrous surfaces.

Both these emulsions are unaffected by many acids, alkalis, salts and solvents. Passage through paint mill rolls and heating for 5 minutes at 200° F will coagulate the resins, but freezing or beating will cause precipitation. Rohm & Haas Co., Resinous Products Div., Washington Sq., Philadelphia 5, Pa. PVP—January.

PORTABLE COMPRESSOR
Diversified Use

A new line of easily handled trailer-mounted portable compressors has been developed for operating small air tools on miscellaneous service jobs, these new compressor units are said to be useful for painting contractors, stone masons, monument workers, public utilities and industrial plants. Their capacity is ample for operating paint spray guns, chipping hammers, light paving breakers, spaders, tampers and similar pneumatic equipment. Denver Co., Quincy, Ill. PVP—January.

FLOW CONTROL AGENT
Prevents Paint from Sagging

Flow control agent, Raybo 6 added to a batch enamel, after the grinding process, prevents or retards the tendency of paints to "sag" or "curtain". The reduction of the sagging tendency is accomplished without affecting the color, gloss, drying and brushing properties of the enamel, according to the manufacturer. Raybo 6 may also be added to the pigment in the grind to improve wetting of the pigment. Raybo Chemical Co. 2915 Penn Ave., Pittsburgh 1, Penn. PVP—January.

CLARENCE J. KRUEGER

Krueger Appointed Manager

Appointment of Clarence J. Krueger as production manager for the paint division of Pittsburgh Plate Glass Company has been announced by E. D. Griffin, vice president.

Associated with the firm since 1927, Mr. Krueger has served as assistant divisional director of the Ditzler Color Division during the past three years. His first position with Pittsburgh's paint division was as a research chemist at the Milwaukee, Wisconsin plant. During a four year period he served as a production efficiency expert and later as superintendent of the industrial enamel plant at Milwaukee. Prior to his entry into military service as an infantry captain ten months before Pearl Harbor, Mr. Krueger was responsible for general plant efficiency at the Milwaukee plant.

As production manager for the paint division, Mr. Krueger will have headquarters at the firm's Pittsburgh, Pennsylvania general offices.

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Dewatex Forms Asphalt Div.

The Dewatex Manufacturing Corporation, New York 18, New York, have announced the formation of their Asphalt-Seal Division. This division has been formed to take over the sales and distribution of their newly developed product Asphalt-Seal.

N. Y. U. Finishes Course

Second term registrations for courses in surface finishes given at New York University will be held on Jan. 25–27, 6: 30 to 8: 30 P. M. at South Hall, University Heights Campus, Bronx N. Y. Courses scheduled for this term are:

Ch. E. 174–175. SURFACE FINISHES. Prerequisite: Ch. E. 71, 81. Adjunct Associate Professor Kronstein. Full course, first and second term: Wednesday, 7: 00–9: 05.

A study of the principles involved in protective, decorative, and functional finishing. Economic factors. Forms of finishing problems. Types of surfaces, types of finishes, methods of application. Specifications, test methods. Research, production, and control methods. Advanced finishing problems.

Ch. E. 176–179. SURFACE FINISHES LABORATORY. Prerequisite: Ch. E. 175. Adjunct Associate Professor Kronstein. Full course, first and second term. Friday, 7: 00–10: 00.

A laboratory introduction to the basic processes of decorative and protective finishing. The various methods of evaluating and testing surface finishing products and their application are studied.

Ch. E. 301–302. RESEARCH. Adjunct Associate Professor Kronstein. Properly qualified students may pursue experimental studies in connection with the preparation of theses. The work is to be carried out under the direction of Professor Kronstein.

For any additional information, write to Henry J. Masson, Assistant Dean, in Charge of Graduate Div., New York University, College of Engineering University Heights 53, N. Y.

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Am. Wheelabrator Representative

J. Robert Bunch has been appointed sales representative to assist J. D. Alexander in the Cleveland sales office of American Wheelabrator and Equipment Corp., Mishawaka, Indiana.

He received his formal education at Indiana University, and joined this company in 1936. After spending nine years in various production departments, he has, for the past four years, supervised the erection and servicing of Wheelabrator blast cleaning equipment and Dustube collectors in the Cleveland area.

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W. C. Hardesty Officers

The following change in the officers of the W. C. Hardesty Co. took place recently. The new officers are: President, A. F. Kitchel; Vice-Presidents, W. J. O'Connell and E. Jobbins, Secretary and Treasurer, F. R. Cantzlaar, Mr. Hardesty is no longer connected with the company either as a director or as an officer.

Exchange Club Meeting

The Paint and Varnish Exchange Club. Inc., will hold its next regular meeting on Tuesday, February 14, 1950 in the Taft Room of the Taft Hotel, New York City at 7 P.M. Mr. Benjamin Einhorn, chairman of the program committee announced that the guest speaker will be Mr. George S. Cook of Engineer Research & Development Laboratories, Fort Belvoir, Va. His subject will be "Protective Coatings in the Corps of Engineers". Guests will be welcome at this meeting.

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Hercules Powder Assignments

Two new personnel assignments in Hercules Powder Company's plastics promotion group were announced recently.

Emmett E. Hixon has been transferred from the New York sales office to Wilmington, where he will be concerned with the promotion of cellulose acetate plastics.

John B. Martin has been assigned to the ethyl cellulose plastics promotion group. Richard S. Clark has been transferred to the New York office to replace Mr. Hixon.

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Am. Cyanamid Names Miller

American Cyanamid Company announces the appointment of Dr. Wilbur H. Miller as technical representative and assistant manager of the Company's Washington, D. C. Office. Dr. Miller will act as liasion between the various governmental laboratories and the American Cyanamid Company's technical facilities. Dr. Miller has been on the staff of Cyanamid's Stamford Research Laboratories since 1941.

DR. WILBUR H. MILLER

DuPont Authorizes 2nd Grant

The DuPont Company announced that it has authorized, for the second year, $100,000 for grants-in-aid to universities to "stock-pile" knowledge through the advancement of fundamental science.

These grants-in-aid are for unrestricted use in the field of fundamental chemical research. This plan of assistance was inaugurated last year by DuPont on a trial basis with the aim of increasing the amount of such research being done in this country.

The grants are for the 1950–51 academic year. They provide $10,000 for each of 10 universities, all of which received similar awards from the company for the present school year. The company also provided $20,000 to the University of Chicago for a calendar year 1950 membership in its Institute for the Study of Metals.

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Glyco's New Chicago Office

Dr. George H. Goodyear, Chicago manager for the Glyco Products Co., Inc. of Brooklyn, N. Y. and Natrium, W. Va., announced that their offices have been removed to the Tribune Tower Building, 435 N. Michigan Ave., Chicago 22, Illinois. The new telephone numbers will be WHitehall 4-5747 and 5748.

DR. ZAY JEFFRIES

G-E Retires Zay Jeffries

Dr. Zay Jeffries, vice president of the General Electric's four-man committee the Chemical Department, retired from the company December 31.

A pioneer and leader in the fields of chemistry and metallurgy, Dr. Jeffries during the war was vice chairman of the War Metallurgy Committee and chairman of two of its sub-committees. He also served as consultant for the University of Chicago metallurgical laboratory, part of the Manhattan Project for research and development work on the atomic bomb.

Dr. Jeffries has been a member of General Electric's four-man committee which administers the Nucleonics Project, consisting of all work on atomic energy being conducted by the company for the government.

He began service with General Electric in 1914 as a consultant to the National Lamp Works. From 1932 to 1936 he was also president of the Carboloy Co., Inc., a General Electric affiliate, and since then has been a member of the board. In 1936, he became technical director of the G.E. Lamp Department.

In January, 1945, Dr. Jeffries was elected a vice president by the G-E Board of Directors and placed in charge of the newly-formed Chemical Department. His department has responsibility for operations pertaining to resins, insulating materials, plastics, silicones, and other products.

He is a trustee of Case Institute of Technology and of Battelle Memorial Institute.

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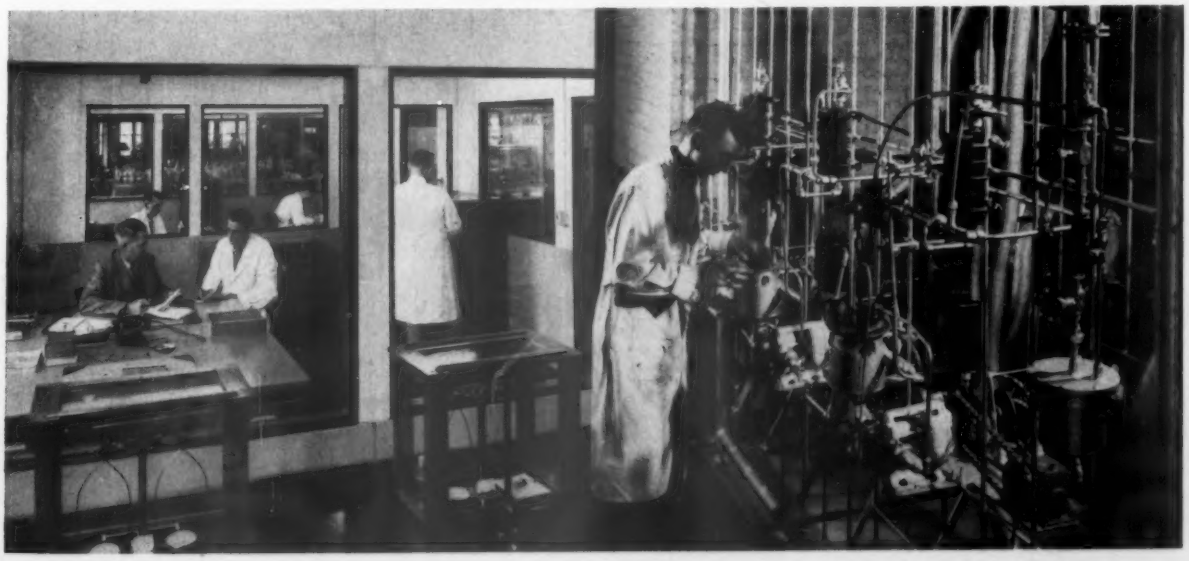
Harshaw Laboratory

The Harshaw Chemical Company, Cleveland, has recently completed a new modern research laboratory for the investigation of pigments and metallic soaps. The office partitions are movable steel and asbestos composition board.

The laboratory apparatus for the preparation of metal soaps are scaled-down models of the actual equipment used in plant operation and of the same metals. These are operated in just the same way as the plant equipment so as to duplicate plant conditions in the laboratory. From this research laboratory, processes are carried to plant scale in semi-works department. Left: View through office laboratory for research in metallic soaps and dry colors. Right: Miniature plant production of metallic soaps by fusion process using Dowtherm heating.



Harshaw's New Modern Research Laboratory

American Can Sells Plants

Carl H. Black, president of the American Can Company, announced the sale of two of the company's manufacturing plants, at Toledo, Ohio, and Atlanta, Ga., respectively, to the J & L Steel Barrel Company. Through the transaction the purchasing company, wholly-owned subsidiary of Jones & Laughlin Steel Corporation, of Pittsburgh, will assume the galvanized ware and heavy steel container business of the can manufacturing firm.

In confirming the transaction, Admiral Ben Morcell, president of Jones & Laughlin Steel Corporation, stated that by agreement with American Can the factories involved in the sale would continue without interruption of operations or deliveries. The Toledo plant now employs about 330 people while employment at Atlanta totals 113. Both plants have been operated by the can company since 1901.

GEORGE S. FORBES

Glidden Names Forbes

Appointment of George S. Forbes as manager of the Glidden Company's Cleveland Industrial Sales Division was announced recently by A. D. Duncan, Glidden vice president. Mr. Forbes succeeds Edward C. Shurtleff, who has retired after 46 years service with the firm.

Mr. Shurtleff began his sales career with Glidden in 1904 and was named manager of the Cleveland Industrial Sales Division in 1929 after serving in important accounting and sales promotion positions.

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Archer-Daniels-Midland Plant

Mankato, Minnesota has been selected as the site for a new Archer-Daniels-Midland soybean plant, according to T. L. Daniels, president of the Minneapolis firm. The new three million bushel plant will be ready for operation by next October when the 1950 crop of soybeans is harvested. Along with other processing plants already located in that area, it will make Mankato the center of Minnesota's soybean industry.

Daniels revealed that Archer-Daniels' plans call for at least five separate structures. The grain elevator, whose foundations will rest on rock, will be one of the tallest ever built. It will contain cleaning and drying equipment. A second structure, three stories high and about ninety feet square, will house the heavy machinery which prepares the beans for processing. The five story solvent plant will contain much machinery and auxiliary epuipment especially designed and developed by A-D-M research engineers.

TECHNICAL Bulletins

WHITE ENAMELS

This bulletin describing the development of a speed bake white synthetic for reflecting surfaces of lighting fixtures has been prepared by Monsanto Chemical Company.

Advantages derived from the coating are outlined in the bulletin. They include improved durability, color retention, reflectivity and chemical resistance. A high quality finish is economically obtained by a single coat application and a short baking cycle, according to the bulletin.

The bulletin, issued by Monsanto's Merrimac Division, covers specifications and application possibilities of this white enamel.

CATECHOL

Bulletin C-9-127 issued by the Chemical Div. of Koppers Co., Inc., Pittsburgh 19, Pa. contains pertinent information on the use and properties of catechol in various industries. Of particular interest in the paint and varnish industries, catechol has been investigated as possible anti-skinning agents for oleoresinous paint and varnishes. Quantities ranging for 0.05% to 0.15% based on the vehicle have been suggested.

Chemical reactions which catechol is capable of undergoing are taken up in detail. These include hydrogenation, halogenation, nitration, sulfonation, carboxylation, alkylation, oxidation, esterification, etherification, ammonolysis and acylation.

LIQUID HANDLING

Sixteen page catalog describes and illustrates asbestos filter sheets, production and laboratory filters, a stainless steel centrifugal pump; portable, mobile and stationary vacuum bottle filters used in handling liquid chemicals. Filters included are the disc-type, cylinder, stainless steel and hard rubber models, pyrogen and bacterial retentive types. "Liquid Handling Equipment" is issued by the Ertel Engineering Corp. Kingston, N. Y.

PAINT SPECIFICATIONS

Supplement 4, Circular 731, issued by the Scientific Section of the National Paint, Varnish and Lacquer Association, Inc., Washington 5, D. C., contains changes in U. S. Government specifications, which appeared in circular 731. Also included is a list of new specifications.

PIGMENT DISPERSION

The Scientific Section of the National Paint, Varnish and Lacquer Association, 1500 Rhode Island Ave., N. W., Washington 5, D. C. has issued a bulletin on Pigment Dispersion by R. B. Shurts, outlining the problems and findings to date.

HEATING AND COOLING

Tank Heating and Cooling is vividly described and illustrated in a new six-page bulletin released by the Kold-Hold Manufacturing Company of Lansing, Michigan. A direct comparison is made between the Platecoil and pipe coil methods of heat exchange. The bulletin shows how Platecoil takes only half the tank space, yet heats faster than pipe coil. The ten advantages of Platecoil are described in relation to savings in time, money and manpower for the user. Copies of the Bulletin may be secured by writing the Kold-Hold Manufacturing Company, Lansing, Michigan.

POLYETHYLENE SPRAYING

The corrosion and deterioration of metal storage tanks and drums by chemicals and the consequent contamination of the chemicals has long been a critical problem in the process industries. A method of applying corrosion resistant linings of polyethylene has been developed and is now available for immediate application. Polyethylene powder is sprayed through a flame spray pistol manufactured by Schori. This company has just issued a technical bulletin, No. 103D describing in full detail the method of applying polyethylene to metal surfaces.

The information in this bulletin is the result of extensive research work done by Schori and the du Pont Company. Properly applied, the polyethylene coating will be fully resistant to attack of almost all chemicals at temperatures as high as 180 deg. F. The bulletin includes tables that show the results of one year tests on a long list of chemicals, and can be obtained from Schori Process Div., Ferro-Co Corp., 8–11 43rd Road, Long Island City 1, N. Y.

PRODUCTS AND SERVICE

Publication of a revised edition of "Products and Services of American Cyanamid Company for Industry and Agriculture" has just been announced by the firm. This 64-page illustrated book briefly describes the products and services which Cyanamid offers to industry, agriculture and mining, and outlines the divisional structure through which such products are sold. Copies of the new publication are available upon written request to the American Cyanamid Company, 30 Rockefeller Plaza, New York 20, New York.

ACID INHIBITOR

The Monsanto Chemical Co. of St. Louis Mo. has recently released a 40 page bulletin describing the uses and functions of Hibitite acid inhibitor for the steel industry in pickling and cleaning ferrous metals. It is said that this inhibitor is an excellent aid in producing clean, bright, high-quality products without excessive metal or acid losses. This bulletin contains detailed instructions for inhibiting sulphuric, muriatic and phosphoric acids with Hibitite.

SOLUBLE SILICATES

Uses and properties of soluble silicate powders are covered in a 15-page pocket-size booklet recently issued by the Philadelphia Quartz Co., Philadelphia 6, Pa. Silicates of soda and potash, and sodium metasilicate and sesquisilicate are described. Charts listing the advantages and properties of the particular silicate for each of the known uses are also included.

REPORT WRITING

Reprints of the paper "Essentials of A Good Report" are available in booklet form. A step-by-step system for organizing and writing reports are given. Suggestions covering such factors as to style of presentation, grammar, nomenclature, appendices, mathematical data, use of tables and illustrations, etc. are also presented. This booklet is issued by Evans Research and Development Corp. 250 E. 43rd Street, New York, N. Y.

CENTRIFUGAL PUMPS

Line of centrifugal pumps is represented in 35-page, 2-color catalog. Impellers of these pumps can be selected from several types best fitted for the job. Photographs of installations, complete dimensional data with approximate weights, sectional diagrams and pump characteristics are included. Priming inductors are also discussed. Nagle Pumps, Chicago Heights, Ill.

CORROSION CHART

A new, complete chart showing the resistance of both resin and silicate cements to various corrosive chemicals has recently been issued by the Special Chemicals department of The Pennsylvania Salt Manufacturing Company.

Designed as a tool to aid the corrosion resistant masonry construction trade in selecting the proper cement for specific industrial uses, the chart shows the resistance of Pennsalt PRF, Asplit, Causplit, Pennsalt HF, and Penchlor Acid Proof Cement to a list of 259 chemicals and chemical compounds from acetaldehyde to zinc sulfate. Copies may be obtained by writing Special Chemicals Department, Pennsylvania Salt Manufacturing Company, 1000 Widener Building, Philadelphia 7, Pa.

ALUMINUM SOAPS

A new booklet, "Aluminum Soaps for Lubricating Grease Manufacture" is being presented by Mallinckrodt. It contains descriptions of their major gel-forming aluminum stearates together with comprehensive discussions of good manufacturing techniques, the advantages of using combinations of aluminum soaps, an improved method for the laboratory evaluation of greases, common grease-plant troubles and their remedies and some important factors which can affect grease manufacture. Copies of this informative booklet and samples of Aluminum Stearate Technical D-50 may be obtained from the St. Louis or New York offices of the Mallinckrodt Chemical Works.

TEMPERATURE REGULATORS

A new 6-page folder describing construction and operation of the Type E2T100 temperature regulator is available from Spence Engineering Company, Inc., Walden, New York.

Folder contains illustrations showing how the regulator is especially adapted for storage heaters and instantaneous heaters because it varies steam pressure in definite steps with very small temperature changes at the thermostat bulb.

Also explained are these characteristics: 1. Fast change in rate of heat transfer when load variations occur. 2. Dead-end shut-off when load ceases and no steam is required. 3. No stuffing boxes to maintain.

Folder describes how regulator constantly resets itself in a positive step action as the result of minute changes at the thermostat bulb. This controls steam flow into the heater in proportion to the demand. Because pressure rises or falls as load changes occur, rapid variations in rate of heat transfer are possible.

FLOAT VALVES

Direct-acting and pilot-control float valves, and float boxes with control valve are illustrated and described in a 4-page circular issued by O. C. Keckley Co., 440 W. Madison St., Chicago 6, Ill. Operation, construction, and dimension of single-seat and balance float valves are presented.

European Federation Papers

Published by the Swiss Association of Chemists and Technologists of the Varnish and Paint Industry.

The inaugural convention of the Continental European Federation held on May 11–12, 1949 in Basle featured many interesting papers on paint and varnish chemistry. The Swiss Association of Chemists and Technologists of the Varnish and Paint Industry acted as host to the Basle Convention and have undertaken the publication of these papers in three volumes.

The first of the three "Special Editions" of the Swiss Bulletin covered the activities of the inaugural session and the records of the foundation of Continental Federation, which at the present time includes the coatings industry of Belgium, France, Italy, the Netherlands, and Switzerland. It also pointed out the close cooperation this organization is obtaining with related Federation groups in the United States and England.

Papers on the subject—"Polymers as Film-forming Substances" are presented in the remaining two volumes. The chairman of this meeting was Dr. A. V. Blom, who recently wrote an interesting book entitled, "Organic Coatings in Theory and Practice", (Reviewed in *Paint and Varnish Production,* Vol. XXIX, No. 10).

Four papers on this subject were presented:

(a) Aspects of Petroleum Chemicals in Relation to the Surface Coating Industry by A. V. Billinghame, (Shell Products Co., Ltd., London).

(b) Polyvinyl derivatives as Film-forming Substances by R. Chazal, (Soc. des Usines Chemique, Paris).

(c) The use of Vinylhalogen Derivatives in Varnishes and Paints by M. Fournier and G. Le Cordier, (Soc. Saint Gobain, Paris).

(d) Silicone Polymers by W. R. Collings (Dow-Corning Corp., Midland, Mich.).

It is interesting to note that Mr. Billinghame presented actual petroleum derivatives as the chemical source of surface coating materials and did not concern himself with only bituminous materials derived from petroleum by-products. He showed how the cracking process yields alcohols and acetone, and mentioned the Fischer Tropsch synthesis in the production of oxygenated products. He further pointed out how cracked gases may be used in making such solvents as isopropylalcohol, methyl isobutyl ketone, etc. He also illustrated how acetone which is obtained from petroleum cracking may be converted into acetic anhydride by the ketone process and finally into the production of cellulose acetate. In another process, acetone is used in the manufacture of bisphenols for resin products and in the formation of synthetic glycerol for alkyd manufacturing. Finally, Mr. Billinghame described the use of olefins in the carbonylation and oxo processes for the production of primary alcohols which may be further esterified to give plasticizers. These are valuable in vinyl resin coatings. Complete charts and tables are also included in this paper.

Messers Fournier and Le Cordier's presentation on vinyl resins consists of similar work which is now being carried on in this country on this subject.

Silicones as covered by W. T. Collings referred to the work done by Dow during the war on the use of this resin in surface coatings.

The third volume contains four papers with concluding remarks by Dr. Blom. The four papers are:

Polymer Alkyl Resins by R. Paul (Soc. des Usines Chmiques, Rhone-Poulenc, Paris).

Epoxy Resins by Dr. G. H. Ott (Ciba, Basle).

Improved Film-forming Materials from Dehydrated Castor Oil by R. Wilson (British Paints Ltd., Newcastle-on-Tyne).

Modern Paint Design and Formulation in America by Dr. J. S. Long, (Devoe-Raynolds Co., Louisville, Ky.).

Dr. Paul used a direct condensation of acetylene and allylalcohol in the presence of potassium allylate in the production of allyl-vinyl-ether.

By the use of certain catalysts, he transformed this colorless fluid into a soluble, but viscous substance which is described as a pre-polymer.

Dr. Paul attributes the formation of this polymer to ordinary vinyl polymerization and in this regard referred to the early work of the late Dr. Abraham Kronstein who was a pioneer in this particular field.

In the second step, the pre-polymer is converted into a transparent, hard, and insoluble mass which may be used as a coating for metal or for wood.

Dr. Ott's paper also considered the condensation resins which may be obtained between polyphenols and epihalohydrines. They are called "Epoxy Resins", and initially are thermoplastic, but they may be reacted with polybasic acids, anhydrides, amines, or polyphenols and converted into insoluble and infusible products. This is caused by the reactivity of the resin due to the presence of epoxy and hydroxy-groups.

Dr. Ott also referred to his own work on Swiss "Ereldit" resin. This paper is extremely interesting in view of the work which is presently being carried on "Epon" resins in this country.

The paper presented by Mr. Wilson is very informative and interesting. He described modified castor oils which are produced by saponifying the fatty acids with dehydrated castor oil or subsequent

Left to Right: Leo Roon, Carlton Rose, Marguerite Caillaux, and Dr. Max Kronstein.

re-esterification with higher alcohols, like pentaerythritol, poly-pentaerythritol, or sorbitol.

Maleinized dehydrated castor oil, alkyds produced from this type of dehydrated castor oil, and styrenated dehydrated castor oils are also included. Regarding the styrenated castor oil, Mr. Wilson pointed out that desirable oil characteristics are obtained when a maximum of 20% styrene is used in the copolymerization process. On the other hand, if the styrene content is too great, the oil characteristics of the products are completely lost.

The formation of the Continental Federation has been well received by the American paint chemists. The publication of these papers will undoubtedly help to create mutual interest and cooperation with the American and European paint industries.

The recent visit of Mademoiselle Margerite Caillaux as the European delegate to the Atlantic City convention and her attendance at the New York University Paint Symposium last fall is indicative of the desire on the part of the Europeans to fully cooperate with American paint organizations. Reviewed by Dr. Max Kronstein, New York University.

Spectrophotometry

Published by National Bureau of Standards, U. S. Dept. of Commerce, Washington 25, D. C. Price 25 cents.

Reliable spectrophotometric data should now be more easily obtained with the aid of a new booklet, Spectrophotometry, recently issued by the National Bureau of Standards and made available from the U. S. Government Printing Office.

The techniques and data resulting from the Bureau's extensive experience in spectrophotometry are presented in this guide so that users of spectrophotometer can better understand their instruments, calibrate and maintain them in the proper operating condition, and guard against the numerous errors common in such work. Instruments and methods for use in the ultraviolet, visible, and near-infrared spectral regions are considered, including photographic, visual, and photoelectric methods. Important topics covered include definitions of spectrophotometric terms, essential parts of spectrophotometers, typical instruments in current use, types of errors which usually occur in spectrophotometric work, and presentation of standard data for checking the calibration of spectrophotometers. In addition, a bibliography of 127 related references is given.

Circular 484, Spectrophotometry, by Kasson S. Gibson, 48 large double-column pages, illustrated, available from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., 25 cents a copy. Remittances from foreign countries must be in United States exchange and must include an additional sum of one-third the publication price to cover costs of mailing.

Advances in Catalysis

Advances in Catalysis and Related Subjects. Volume I. By W. G. Frankenburg, V. I. Komarewsky, and E. K. Rideal, editors. Published by Academic Press, 125 E. 23rd St., New York 10, N. Y. Price $7.80.

New scientific theories and methods as an approach to a better understanding of the various aspects of catalysis in chemical reactions are set forth in this volume. Materials undergoing catalytic reactions are covered in detail.

Several leading chemists in the field of catalysis have presented in this volume sections on materials, catalytic reactions, isomerization, experimental studies, and theoretical aspects. To those engaged in studies of inducing polymerization by catalytic means, this book will offer some interesting and worthwhile suggestions.

CLUB NEWS

MONTREAL

The regular monthly meeting of the Production Club was held on Dec. 7th with 52 members and guests present. Mr. R. Grant, who represented the club at the Atlantic City convention, remarked on the large attendance and fine spirit of friendship shown there.

Mr. E. P. Lanthier informed the members that a paint technology course would be offered at the Montreal High School in mid-January and that registration would open soon.

The meeting was then turned over to the chairman of the technical committee, Mr. D. E. Wiley; who introduced Mr. L. Eiring. Mr. Eiring spoke on exterior house paints, and traced the development of these paints from early days to the present time, showing how the introduction of new pigments had improved their properties.

The second speaker was Mr. G. Fearnley whose subject was Drying Oils. He outlined the classification of these oils, explained their composition and properties, and gave various theories on the mechanism of drying.

LOUISVILLE

The December meeting was held on the 14th with 44 members and guests attending. President H. F. Donashew introduced F. S. Rethwisch of the Reynold Metals Co. who spoke on aluminum bronze powders. He pointed out that presently 90% of these powders are sold in a ready-mixed form and it is expected that these will be available in alkyd vehicles.

NORTHWESTERN

Sixty-five members and guests attended the December meeting held on the 2nd of the month. President T. J. Skotnicki was formally inducted into office with the presentation to him of a handsome gavel by Mr. Wood, past president.

Morris Slack, the club's Federation representative, reported on the Atlantic City convention.

Ed Carlson introduced the guest speaker, Don Leever of the Reichhold Chemicals, Inc., who talked on "A Survey of Four Hour Enamels". To determine how their recommended formulations for four hour enamels compared with formulations used by the trade, Reichhold Chemicals tested fifteen of the largest selling brands of four hour enamels in each of the four colors white, red, green, and black. Those having label analysis were analyzed, and Mr. Leever complimented the paint industry for its label analysis honesty. These sixty samples were compared with eight of Reichhold formulations for analysis, drying times, initial gloss, gloss retention, color retention, weatherometer exposure, flexibilities, viscosities, percents N. V., weights, hiding, chemical resistances and can stabilities. Tables containing this data were distributed to the members.

The Reichhold recommendations compared well with the averages. The alkyd enamels were best in all respects except for water and chemical resistances. The survey showed a wide variation in quality and drying.

NEW YORK

The first regular meeting of the new year was held January 5, 1950 in the 26th floor rooms of the Building Trades Employers' Association, 2 Park Ave., New York City.

Dr. Roy Kienle was the speaker of the evening. His subject will be "Physical Chemical Research in the Protective Coating Industry." This paper dealt with the part that the tools of physical chemistry can play in improving the products of the protective coating industry.

Because of his outstanding position in the field of protective coatings Dr. Kienle was elected to present the first Joseph J. Mattiello Lecture given in Atlantic City in November. Dr. Kienle is assistant director of research for the Calco Chemical Div. of the American Cyanamid Co. He pioneered in the development and theory of alkyd resins and today is a recognized authority in the field of polymers, dyes, and pigments.

C-D-I-C

The 294th meeting was held on Nov. 14th with 55 members and guests attending.

Program chairman Herb Fenburr introduced F. B. Stieg of the Titanium Pigment Corp. who spoke on Emulsion Paints. Shortages during the war caused the development of "War Time" paints, included in which were low oil content emulsions with all their undesirable properties. These properties have made some consumers skeptical of using water type paints since the war. However, with newer developments, such as the "continuous film producing emulsion paints" both in flat and gloss, these water type paints have over-come all the objectionable properties. Mr. Stieg outlined formulations and procedures for preparing these paints, stating that they required no specialized equipment for manufacture. A lengthy question and answer period followed this talk.

The December meeting attracted 34 members and guests. President Petke introduced Charles S. Bogin of the Commercial Solvents Corp. whose talk was entitled "Some Aspects of the Formulation of Lacquer Volatiles".

Mr. Bogin pointed out that the big difficulty with lacquers was in applying a coating with higher solids. Technical men for years have been striving to produce such a lacquer coating, through various means, such as lower viscosity nitrocellulose, hot lacquers and greater solvency of the thinners. He discussed all of these with emphasis on the solvent power of the esters, the latent solvents, butanol and ethanol, and the diluents, such as aromatic and aliphatic naphthas.

He told of furniture manufacturers who while saving a few cents per gallon on lacquer thinners because they contained cheaper solvents or more diluent, were spending five to eight dollars more per gallon for labor in the rubbing operation of these lacquers. During the war scarcity, and up to 1947, the price variance between butyl acetate and ethyl acetate, butanol and ethanol, and diluents, made the formulation of poorer grade lacquer thinners imperative both from obtainability and costwise. This problem no longer presents itself and for a few pennies more a much superior lacquer thinner can be made. He stressed that this should be pointed out to the manufacturer who used the lacquer in order that he might produce a higher quality product. Mr. Bogin illustrated his talk with a few slides of charts showing the optimum quantity of solvents, latent solvents and diluents to be used in producing the desired thinner combinations.

WESTERN NEW YORK

Dr. C. B. F. Young, president of the National Southern Products Corp. was guest speaker at the regular meeting of the Western New York Paint Production Club held on November 30th. Also present from National Products were George Ikes, technical sales representatives and Carl Perkins, chief chemist. Dr. Young traced the use of tall oil in the paint industry tracing the background and development of this paper industry by-product.

W. H. Lutz of the Educational Committee reported on the joint meeting of his committee with the Buffalo Paint and Varnish and Lacquer Association.

An essay contest will again be sponsored by the club. This contest was established a year ago, and the first prize is increased to $50.00, second to $15.00. Contestants are to prepare essays on technical subjects pertaining to paint and varnish production.

PHILADELPHIA

Officers elected at the November meeting are as follows:

President, *Gus Wescott;* Vice President, *John Harner;* Secretary, *Don Munson;* Treasurer, *Al Crompton;* Assistant Treasurer, *Proctor Wetherhill.*

Hugh McConaghie, the retiring president gave his farewell speech in which he outlined the events and progress of the past year. He complimented the club membership for their attendance and cooperation.

A very interesting film and talk was then given by Mr. Oakley H. Garlick of the Paul O. Abbe Co. The subject was "Ball and Pebble Mill Operation," and the films showed very completely what actually takes place inside the mills. A very spirited question period proved the interest taken in Mr. Garlick's presentation.

CHICAGO

The November meeting held on 21st of the month attracted some 100 members and guests. Officers elected for the coming year included the following:

P. DeLeeuw, president; *T. F. Byron,* vice-president; *L. H. Ludwig,* secretary; *H. A. Price,* treasurer.

G. M. Babcock of the Reynold Metals Co. was the speaker and he presented a film entitled "The Tale of the Powdered Pig", showing the use of powdered aluminum in protective coatings.

CALENDAR OF EVENTS

Feb. 27–Mar. 3, 1950. 1950 A. S. T. M. Committee Week and Spring Meeting, Hotel William Penn, Pittsburgh, Pa.

Mar. 8–10, 1950. Spring Meeting of the Southern Paint and Varnish Production Club. Machinery and Raw Material Exhibit, Hotel Peabody, Memphis, Tenn.

Mar. 28–31, 1950. National Plastics Exposition, Navy Pier, Chicago, Ill.

April 4–7, 1950. Sixth Annual Conference of the National Association of Corrosion Engineers, St. Louis, Mo.

April 24–27, 1950. The Nineteenth National Packaging Exposition of the American Management Association, Navy Pier, Chicago.

April 25–26, 1950. Metal Powder Show and Sixth Annual Meeting of the Metal Powder Association, Book-Cadillac Hotel, Detroit, Mich.

June 26–30, 1950. 1950 A. S. T. M. Annual Meeting and Ninth Exhibit of Testing Apparatus and Equipment, Chalfonte-Haddon Hall, Atlantic City, N. J.

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Acid Number	195 - 199
Saponification Value	196 - 200
HEAT STABILITY: After heating to 235° C for five hours with CO_2 Color-Gardner Standards 1933	5 - 7

HARDESTOIL 16	
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Color-Gardner Standards 1933	3 - 5
Iodine Value (Wijs)	minimum 135
Free Fatty Acid (as oleic)	96 - 98%
Acid Number	191 - 195
Saponification Value	192 - 196
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